交通高职高专院校统编教材

Qiche Shangmao Yingyu

汽车商贸英语

（汽车检测与维修、汽车运用技术、汽车运用工程专业用）

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内 摇容 摇提摇 要

本书共分为13个单元，前2个单元讲述了汽车发动机及底盘的主要组成和结构；后11个单元为汽车商贸英语的核心内容，讲述了汽车营销领域开展业务的各个方面，包括询价、产品介绍、谈判、分期付款、装运、保险、办证、售后服务、代理、合同、申述及索赔等。

本书为高职教育汽车技术服务与营销专业的英语教材，也可供欲从事汽车营销工作的相关人员进行培训之用。

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前摇摇言

为了适应并推动高等职业技术教育的发展，落实交通部科教司《高职高专专业教材建设规划方案意见》（高[1999]171 号文件）精神，在交通部科教司领导下，交通高职教育工作委员会组织编写了汽车检测与维修、汽车运用技术、汽车运用工程等相关专业用高职高专统编教材。为此，我们编写了这本汽车商贸英语教材。本书可作为高职教育汽车技术服务与营销专业的英语教材，也可供欲从事汽车营销工作的相关专业人员进行培训之用。

本书分为两个部分，共 13 单元。第一部分是汽车发动机与底盘构造，分为 2 单元，讲述了汽车发动机及底盘的主要组成与结构。第二部分为汽车商贸英语的核心内容，分为 11 单元，讲述在汽车营销领域开展业务的几个方面，主要围绕询价、产品介绍、谈判、分期付款、装运、保险、办证、售后服务、代理、合同、申诉及索赔。本书材料选自国外的专业书刊、修理企业的外文资料、国内各大院校的汽车专业英语教材、各大院校的商贸类英语教材、网上有关介绍商贸英语的最新资料及国内一些相关刊物。为便于学习，本书在课后都附有词汇表、重点和难点句子的注释、常用句介绍及课后练习。

本书由浙江交通职业技术学院王怡民教授、博士主编，边浩毅副主编。本书第三单元、第四单元、第七单元、第八单元、第十单元由王怡民编写，第五单元、第六单元、第九单元、第十一单元、第十二单元、第十三单元由边浩毅编写，第一单元、第二单元由马林才编写。

本书由宁波高等专科学校李维维编审主审，由张美田担任责任编委。

本书在编写过程中得到了四川交通职业技术学院魏庆曜、河北交通职业技术学院刘振楼等人的大力支持，还得到了浙江交通职业技术学院陈文华的协助，在此一并表示感谢。

由于编写时间紧迫，经验不足，水平有限，缺点错误在所难免，恳请广大师生和读者批评指正。

编**摇摇**者**摇摇摇**

2004 年 3 月 9 日

本书编委会

目摇摇录

第一单元摇四冲程发动机介绍

Unit One摇Introduction to the Four-stroke Engine

Internal Combustion Engine

The engine is a self-contained power unit which converts the heat energy of fuel into mechanical energy for moving the vehicle.[1] Because fuel is burned within the engine, it is known as an internal combustion engine. In the internal combustion engine, air/fuel mixture is introduced into a closed cylinder where it is compressed and then ignited. The burning of the fuel causes a rapid rise in cylinder pressure which is converted to useful mechanical energy by the piston and crankshaft. The most common engine is the four-stroke piston engine. These four strokes are intake stroke, compression stroke, power stroke and exhaust stroke.

Intake Stroke

The intake stroke of a four-stroke engine begins with the piston at top dead center (TDC). The starter causes the crankshaft to rotate in a clockwise direction. The crankshaft, through the connecting rod, forces the piston to move downward. This downward movement of the piston creates a vacuum, a difference in pressure, in the space above the piston. The engine manufacturer times the intake valve action so that it opens automatically at or slightly before the piston starts down. Therefore, a mixture of gasoline and air, pushed by the atmospheric pressure outside the engine, rushes through the intake manifold and into the engine cylinder. At the same time, the exhaust valve remains closed during this downward stroke of the piston. This valve closure prevents the entering air/fuel charge from escaping through the exhaust port. After the piston reaches the bottom of its first stroke, the cylinder is practically full of an air/fuel charge. The drawing of an air/fuel charge into the cylinder in this manner, during the downward movement of the piston, constitutes the intake stroke of the piston.[2]

Compression Stroke

After the piston reaches bottom dead center (BDC), it moves upward again as the starter continues to turn the crankshaft in a clockwise direction. As the piston is beginning to move upward, the intake valve closes, and the exhaust valve remains closed. Since both valves are closed, the piston compresses the air/fuel mixture in the small space between the top of the piston and the cylinder head. As the piston reaches TDC again during its upward travel, the compression stroke of the piston is over. The air/fuel charge is now under compression so that it will produce a great deal of power when the spark plug ignites it.

Power Stroke

Just as or slightly before the piston reaches TDC on the compression stroke with the air/fuel

mixture fully compressed, a timed electrical spark appears at the spark plug. This spark ignites the compressed air/fuel mixture. The burning mixture begins to expand; the pressure in the combustion chamber above the piston immediately increases. This results in a high pressure applied to the top of the piston. Now, both valves remain closed during the power stroke. This assures that the total force of the expanding gas applies itself to the head of the piston. This tremendous force pushes the piston downward on the power stroke, causing the connecting rod to rotate the crankshaft.[3] In other words, the force resulting from the expansion of the burning air/fuel mixture is turning the crankshaft.

Exhaust Stroke

Near the end of the downward movement of the piston on the power stroke, the camshaft opens the exhaust valve, but the intake valve remains closed. Although much of the gas pressure has expended itself driving the piston downward, some pressure still remains when the exhaust valve opens. This remaining pressurized gas flows comparatively freely from the cylinder through the passage (port) opened by the exhaust valve.[4] Then, as the piston again moves up in the cylinder, it drives any remaining gases out of the cylinder past the open exhaust valve. In other words, while the exhaust valve is open, the upward movement of the piston provides an effective method for discharging all waste gases from the engine cylinder and combustion chamber. As the crankshaft nears the end of its second complete revolution, the piston again approaches the TDC position. At this point the exhaust valve is closing and the intake valve starts to open. Both valves are open together for a short period of time in order to accelerate the fresh air/fuel charge to flow into the cylinder. As the piston travels through the TDC position and starts downward again in the cylinder, a new operating cycle begins. The four strokes are continuously repeated in every cylinder as long as the engine remains running.

Engine Classification

For identification purposes, manufacturers classify automobile engines by their cylinder arrangement, valve arrangement, and type of system used to cool the engine.[5]

Engine Block

The engine block forms the main framework, or foundation, of the engine. The block is cast mainly from gray iron or iron alloyed with other metals such as nickel or chromium. However, some blocks have been made from aluminum. In any case, the block itself has many components.

The cylinders are cast into the block. The cylinders are circular, tubelike openings in the block, which act as guides for the pistons as they move up and down. In aluminum blocks, the manufacturer usually installs cast-iron or steel cylinder sleeves (liners). The water jackets are also cast into the block. Finally, the block has cast-in bores for both the camshaft and crankshaft.

Many parts are also attached by fastening devices to the engine block. These items include the water pump, oil pan, the flywheel or clutch housing, the ignition distributor, oil and fuel pump, and the cylinder head.

Cylinder Head

The cylinder head is bolted to the block. The manufacturer casts the cylinder head in one piece from iron, from iron alloyed with other metals, or from aluminum alloy. Aluminum has the advan-

tage of combining lightness with rather high heat conductivity. Depending on the style of engine, the cylinder head serves many functions. For example, in all engine types the head forms an upper cover for the cylinders; therefore, the head forms the upper portion of the combustion chamber. All modern heads provide an access point into the combustion chamber for the spark plug. The final major components attached to the head are the manifolds: one intake and one or more exhaust.

Pistons

The engine manufacturer fits a piston into each cylinder of the engine. The piston is a movable part or plug that receives the pressure from the burning air/fuel mixture and converts this pressure into reciprocating (up-and-down) motion. [6] Manufacturers make most engine pistons from aluminum, which is less than half the weight of iron. Iron pistons were common in early automotive engines.

Piston Rings

Some operating clearance must exist between the piston and the cylinder wall; however, some form of seal is necessary between the piston and the cylinder wall to prevent blowby. Blowby describes the escape of unburned and burned gases from the combustion chamber, past the piston, and into the crankcase. The manufacturer cannot fit a piston to a cylinder close enough to prevent blowby. Consequently, piston rings are used to provide the necessary seal to eliminate blowby and to control oil consumption. [7] Automotive pistons have two kinds of rings: compression and oil control. The compression rings primarily seal against the loss of air/fuel mixture as the piston compresses it and also the combustion pressure as the mixture burns. While the function of the oil control ring is to prevent excessive amounts of oil from working up into the combustion chamber.

Connecting Rods

As mentioned earlier, the piston moves up and down in the cylinder, in a reciprocating motion. In order to rotate the drive wheels, a connecting rod and crankshaft must change reciprocating motion to rotary. The connecting rod itself attaches at one end to the piston and on the other end to the crankpin section of the crankshaft. [8]

Crankshaft

The crankshaft is the main rotating member, or shaft, of the engine. Its function, along with the connecting rod, is to change the reciprocating motion of the piston to rotary. In addition, the crankshaft is responsible for driving the camshaft through timing gears, plus operating the accessories via a system of belts and pulleys. Lastly, the crankshaft carries the total torque-turning or twisting effort and delivers it to the flywheel. From the flywheel the torque then passes either to the friction clutch assembly or to the torque converter.

Flywheel

The flywheel is a comparatively heavy wheel, bolted to the flange on the rear end of the crankshaft. Its function is to keep the engine running smoothly between power strokes. Its inertia tends to keep the flywheel rotating at a constant speed. The flywheel also has several other functions. For example, the flywheel has gear teeth around its outer circumference. These teeth mesh with teeth located on the starting motor drive pinion in order to crank the engine over. In addition, the rear surface of the flywheel serves as the driving member of the clutch assembly. [9]

Vibration Damper

Manufacturers usually install a vibration damper and fan pulley assembly onto the drive end of the crankshaft. This damping device controls torsional vibrations.

Valve

Modern engines have cylinder heads that contain valves. These valves open and close ports to allow or stop the flow of gases into or from the combustion chamber. Each cylinder requires at least two: an intake and exhaust.

Camshaft

The camshaft is another rotating shaft within the engine; it serves usually three functions. First, the camshaft has a series of cams that can change rotary motion to straight-line motion which cause the intake and exhaust valves to open. The camshaft will have one cam for each valve, or, in most engines, two cams per cylinder. Second, the camshaft has an eccentric, or special cam, designed to operate the fuel pump. Finally, the camshaft has a gear that drives the oil pump and ignition distributor. The crankshaft drives the camshaft by means of two sprockets and a chain or by two gears. There is a 1:2 gear ratio between the camshaft and the crankshaft; the camshaft turns at half the speed of the crankshaft. Therefore, every two revolutions of the crankshaft produce one revolution of the camshaft and one opening and closing of each valve in the four-cycle engine.

Lifters

A lifter is a cylindrical part within an engine that rests on a cam of the camshaft. As the camshaft rotates, the cam raises the lifter, and the lifter in turn opens a valve. The lifter may be in direct contact with the tip of the valve stem, or it may bear against a push rod that functions along with a rocker-arm assembly to open a valve.[10]

Push Rods and Rocker Arms

Along with the camshaft, valves, valve seats, and valve springs, some valve trains have several other components—the push rods and rocker arms.

Timing Gears

The manufacturer machines a cam lobe into a given shape that produces a given amount of valve-open duration and overlap.

Useful Words & Expressions

1. introduction [ˌintrəˈdʌkʃən] n. 介绍,传入,初步,导言,绪论,入门
2. unit [ˈjuːnit] n. 元件,部件,零件,装置
3. vehicle [viːikl] n. 交通工具, 车辆
4. engine [ˈendʒin] n. 发动机
5. cylinder [ˈsilində] n. 气缸,圆筒, 圆柱体
6. combustion [kəmˈbʌstʃən] n. 燃烧
7. burn [bəːn] vi., vt. 燃烧
8. convert [kənˈvəːt] vt. 使转变,转换...
9. piston [ˈpistən] n. 活塞

10. crankshaft [ˈkræŋkʃɑːft] n. 曲轴
11. ignition [igˈniʃən] n. 点火，点燃
12. intake [ˈinteik] n. 入口，进口
13. starter [ˈstɑːtə] n. 起动机
14. clockwise [ˈklɔkwaiz] adj. 顺时针方向的；adv. 顺时针方向地
15. movement [ˈmuːvmənt] n. 运动，动作，运转
16. vacuum [ˈvækjuəm] n. 真空；adj. 真空的
17. gasoline [ˈgæsəliːn] n. 汽油
18. manifold [ˈmænifəuld] n. 进、排气歧管
19. stroke [strəuk] n. 冲程，行程
20. remain [riˈmein] vi. 保持，逗留，剩余
21. charge [ʧɑːʤ] n. 充气，装料
22. draw [drɔː] vt. 吸引，吸入
23. constitute [ˈkɔnstitjuːt] vt. 组成，构成
24. compress [kəmˈpres] vt. 压缩，浓缩
25. travel [ˈtrævl] v. 旅行，传播，行进
26. power [ˈpauə] n. 能量，动力
27. ignite [ˈignait] v. 点火，点燃
28. spark [spɑːk] n. 火花
29. revolution [ˌrevəˈluːʃən] n. 旋转，转数，旋转一周
30. expand [ikspænd] vt. 使膨胀，详述，扩张
31. apply [əˈplai] vt. 申请，应用，作用
32. expend [ikspend] vt. 花费，消耗，支出
33. passage [ˈpæsiʤ] n. 通道，通路
34. port [pɔːt] n. 港口，端口，通道
35. approach [əˈprəuʧ] vt. 接近，动手处理
36. accelerate [ækˈseləreit] vt. 加速，促进，催促
37. continuously [kənˈtinuəsli] adv. 不断地，连续地
38. attach [əˈtæʧ] vt. 系上，贴上，安装上
39. inertia [iˈnəːʃə] n. 惯性，惯量
40. automobile [ˈɔːtəməbiːl] n. 汽车
41. flywheel [flaiˈwiːl] n. 飞轮
42. arrangement [əˈreinʤmənt] n. 排列，安排
43. overlap [əuvəˈlæp] v. (与...)交迭，部分重叠
44. camshaft [kæmʃɑːft] n. 凸轮轴
45. framework [freimwəːk] n. 构架，框架，结构
46. foundation [faunˈdeiʃən] n. 基础，根本
47. nickel [ˈnikl] n. 镍
48. chromium [ˈkrɔmiəm] n. 铬
49. aluminum [ˌæljuˈminjəm] n. 铝

50. cast [kɑːst] v. 浇铸
51. sleeve [sliːv] n. 套管,轴套,衬套,缸套
52. bore [bɔː] n. 内径,枪膛;v. 钻孔
53. serve [səːv] vt. 服务,可做,适于,具有...作用
54. crankcase [kræŋkeis] n. 曲轴箱
55. bolt [bəult] n. 螺钉;v. 用螺栓紧固
56. seal [siːl] n. 封铅,封条,密封
57. reciprocating [ˈresiprəukeitiŋ] adj. 往复的
58. circumference [səˈkʌmərəns] n. 圆周, 周围
59. expansion [iksˈpænʃən] n. 扩充,膨胀
60. plus [plʌs] prep. 加上,以及
61. blowby [bləubai] n. 窜气
62. via [ˈvaiə] prep. 经,通过,经由
63. sprocket [sˈprɔkit] n. 链轮齿
64. chain [ʧein] n. 链(条)
65. crankpin [kræŋkpin] n. 曲柄销,连杆轴颈
66. flange [flænʤ] n. 凸缘,边缘,轮缘
67. function [fʌncʃən] n. 功能,作用
68. cam [kæm] n. 凸轮
69. eccentric [ikˈsentrik] n. 偏心轮
70. gear [giə] n. 齿轮, 传动装置
71. lifter [liftə] n. 挺杆
72. component [kəmˈpəunənt] n. 部分,部件,零件,元件
73. assembly [əˈsembli] n. 安装,装配,部件,装置,组合体
74. duration [ˈdjureiʃən] n. 持续时间
75. mesh [meʃ] vt. 啮合,相啮合
76. self-contain 自备的
77. internal combustion engine 内燃机
78. heat energy 热能
79. mechanical energy 机械能
80. air/fuel mixture 空气燃油混合物(可燃混合气)
81. intake stroke 进气行程
82. compression stroke 压缩行程
83. power stroke 作功行程
84. exhaust stroke 排气行程
85. top dead center (TDC)上止点
86. connecting rod 连杆
87. intake valve 进气门
88. atmospheric pressure 大气压力
89. intake manifold 进气歧管

90. exhaust valve 排气门
91. bottom dead center (BDC)下止点
92. spark plug 火花塞
93. combustion chamber 燃烧室
94. cylinder head 气缸盖
95. engine block 气缸体
96. water jacket 水套
97. gray iron 灰口铁
98. water pump 水泵
99. oil pan 机油盘
100. heat conductivity 热传导性
101. fastening device 紧固件
102. drive wheel 驱动轮
103. responsible for 负责
104. friction clutch assembly 摩擦式离合器
105. torque converter 液力变矩器
106. fan pulley 风扇皮带轮
107. timing gear 正时齿轮
108. fuel pump 燃油泵
109. piston ring 活塞环
110. compression ring 气环
111. oil control ring 油环
112. vibration damper 扭转减振器
113. torsional vibration 扭转振动
114. oil pump 机油泵
115. ignition distributor 点火分电器
116. gear ratio 传动比
117. valve stem 气门杆
118. push rod 气门推杆
119. valve seat 气门座
120. valve spring 气门弹簧
121. rocker arm 气门摇臂
122. cam lobe 凸轮凸起部,凸轮工作部分

Notes to Text

1. The engine is a self-contained power unit which converts the heat energy of fuel into mechanical energy for moving the vehicle.

发动机是个自备动力的装置,它将燃料的热能转换成机械能,用于推动车辆前进。

2. The drawing of an air/fuel charge into the cylinder in this manner, during the downward

movement of the piston, constitutes the intake stroke of the piston.

可燃混合气在活塞向下运动时被吸入气缸,这个过程就是进气行程。

3. This tremendous force pushes the piston downward on the power stroke, causing the connecting rod to rotate the crankshaft.

在作功行程中,巨大的气体压力推动活塞向下运动,带动连杆转动曲轴。

4. This remaining pressurized gas flows comparatively freely from the cylinder through the passage (port) opened by the exhaust valve.

残余的带压废气相对顺畅地从已被排气门打开的排气道中排出。

5. For identification purposes, manufacturers classify automobile engines by their cylinder arrangement, valve arrangement, and type of system used to cool the engine.

发动机制造商将汽车发动机按气缸排列、气门布置以及冷却系统的类型进行分类。

6. The piston is a movable part or plug that receives the pressure from the burning air/fuel mixture and converts this pressure into reciprocating (up-and-down) motion.

活塞是可动部件,它承受可燃混合气燃烧时产生的压力,并将此力转变成活塞的上下往复运动。

7. Consequently, piston rings are used to provide the necessary seal to eliminate blowby and to control oil consumption.

因此,使用活塞环来对活塞和气缸壁间进行必要的密封,以防止发动机窜气和减少发动机机油消耗。

8. The connecting rod itself attaches at one end to the piston and on the other end to the crankpin section of the crankshaft.

连杆一头与活塞相连,另一头与曲轴的曲柄销相连。

9. In addition, the rear surface of the flywheel serves as the driving member of the clutch assembly.

另外,飞轮的后端面还用作离合器总成的驱动件。

10. The lifter may be in direct contact with the tip of the valve stem, or it may bear against a push rod that functions along with a rocker-arm assembly to open a valve.

气门挺杆或是直接与气门杆顶端接触,或者与推杆相连,推动推杆与摇臂总成一起开启气门。

Exercises

1. Make Choices:

(1) The _____ is a self-contained power unit which converts the heat energy into mechanical energy.

A. crankshaft 摇摇摇摇B. engine 摇摇摇摇C. camshaft 摇摇摇摇D. flywheel

(2) The _____ is the first stroke of a four-stroke engine.

A. power stroke　　B. exhaust stroke　　C. intake stroke　　D. compression stroke

(3) To keep the crankshaft turning smoothly between successive power strokes, the engine need a heavy wheel-_____.

A. crankshaft　　B. connecting rod　　C. camshaft　　D. flywheel

(4) A liquid-cooled engine uses _____ as the medium to remove heat from the engine.

A. a liquid coolant　　B. wind　　C. lubricating oil　　D. ATF oil

(5)_____ describes the escape of unburned and burned gases from the combustion chamber, past the piston, and into the crankcase.

A. Combustion　　B. Blowby　　C. Cooling　　D. Lubricating

(6) The _____ act as guides for the pistons as they move up and down.

A. cylinders　　B. piston　　C. flywheel　　D. camshaft

2. Translate the following into English:

(1)发动机是个产生动力的装置。

(2)四冲程发动机的四个冲程为:进气行程、压缩行程、做功行程和排气行程。

(3)发动机需要飞轮来保持曲轴的平滑运转。

(4)曲轴是发动机的主轴。

(5)活塞是发动机的运动部件,工作时在气缸内上下运动。

(6)连杆与活塞、曲柄销分别相连。

3. 实训:教师按照发动机构造的教学挂图(或其他教学媒体)让学生用英语识别发动机构造。

第二单元摇汽 车 底 盘

Unit Two摇Introduction to the Chassis

The Power Train

The power train carries power from the engine crankshaft to the car wheels so the wheels rotate and car moves.[1] For many years, on most cars the engine has been mounted in the front and the rear wheels were driven. This arrangement includes:

1) The engine, which produces the power.

2) The transmission, either manual or automatic.

3) The clutch on vehicles with manual transmissions.

4) The differential, which sends the power to the two rear wheels through the wheel axles.

5) The drive shaft, which carries the power from the transmission to the differential.

The manual transmission

The manual transmission provides a means of varying the relationship between the speed of the engine and the speed of the wheels. Varying these gear ratios allows the right amount of engine power at many different speeds.

The clutch

The clutch allows you to connect and disconnect the engine and the transmission, both starting up and during shifts. Friction plates route the rotation of the engine crankshaft to the gears, and then to the wheels.

Automatic Transmission

In an automatic transmission, gear ratios are changed automatically. This eliminates the need for the driver to operate the clutch and manually "shift gears". The typical automatic transmission combines a fluid torque converter, a planetary-gear system, and a hydraulic control system in a single unit.

Differential

Differentials are used at the rear of vehicles with rear-wheel drive. They are used at the front in the transaxles of vehicles with front-wheel drive. When the car is on straight road, the ring gear, differential case, differential pinion gears, and two differential side gears all turn as a unit without any relative motion.[2] However, when the car begins to round a curve, the differential pinion gears rotate on the pinion shaft. This permits the outer wheel to turn faster than the inner wheel.

The Drive Shaft

The drive shaft, or propeller shaft, connects the transmission output shaft to the differential pinion shaft. Since all roads are not perfectly smooth, and the transmission is fixed, the drive shaft has

to be flexible to absorb the shocks of bumps in the road. [3] Universal, or "U-joints" allow the drive shaft to flex when the drive angle changes. The universal joint or U-joint is used to connect the drive shaft to the transmission output shaft.

Frame

The frame is a load-carrying beam structure consisting of two side rails, and several cross members. [4] The frame of an automobile provides the support for the engine, body and transmission members. The frame transmits the load through suspension system and axles to the wheels. It withstands the static and dynamic loads within permissible deflection. It should be stiff and strong to resist the severe twisting and bending forces to which it is subjected during motion of the vehicle on the road. [5]

The frame is a fabrication of box, tubular, channel, I, angle, sections etc. The frame of the vehicle is attached to the rear and front wheel and axles with the help of spring and shock absorbers. [6]

Tires, Wheels and Suspension

Tires and wheels are important to vehicle ride, handling, and fuel economy. The tires and wheels must first support the vehicle weight. In addition, the tires and wheels have to transfer the engine and braking torque to the road surface for driving and braking the vehicle.

Suspension System

Suspension system has two basic functions, to keep car's wheels in firm contact with the road and to provide a comfortable ride for the passengers. A lot of the system's work is done by the springs. Under normal conditions, the springs support the body of the car evenly by compressing and rebounding with every up-and-down movement. This up-and-down movement, however, causes bouncing and swaying after each bump and is very uncomfortable to the passenger. These uncomfortable effects are reduced by the shock absorbers.

Suspension, when discussing cars, refers to the use of the front and rear springs to suspend a vehicle's "sprung" weight. The springs used on today's cars and trucks are constructed in a variety of types, shapes, sizes, rates and capacities. Types include leaf springs, coil springs, air springs, and torsion bars. These are use in sets of four for each vehicle, or they may be paired off in various combinations and are attached by several different mounting techniques.

Shock Absorber

In the past, a wide variety of direct and indirect shock absorbing devices were used to control spring action of passenger cars. Today, direct, double-acting hydraulic shock absorber struts have almost universal application.

Steering System and Brake System

The steering system must deliver precise directional control. And it must do so requiring little driver effort at the steering wheel. Truck steering systems are either manual or power assisted, with power assist units using either hydraulic or air assist setups to make steering effort easier.

The key components that make up the steering system are the steering wheel, steering column, steering shaft, steering gear, pitman arm, drag link, steering arm, ball joints, and tie-rod assembly.

Steering wheel

This is the driver's link to the entire system. The wheel is formed of a strong steel rod shaped into a wheel. Spokes extend from the wheel to the wheel hub, which is fastened securely at the top of the steering column. [7]

Steering Column

This is a hollow tube that extends from the steering wheel through the floorboard. It is fastened to the cab at or under the instrument panel and contains bearings to support the steering shaft.

Steering Shaft

The steering shaft is basically a rod, usually jointed, that runs from the top of the steering column to the steering gear.

Steering Gear

This gearbox multiplies steering torque and changes its direction as received through the steering shaft from the steering wheel.

Pitman Arm

The pitman arm is a steel arm clamped to the output shaft of the steering gear.

Drag Link

This forged rod connects the pitman arm to the steering arm.

Steering Arm

Sometimes called a steering lever, this forged steel component connects the drag link to the top portion of the driver's side steering knuckle and spindle. [8] As the steering arm moves, it changes the angle of the steering knuckle.

Ball Joints

This ball-and-socket assembly consists of a forged steel ball with a threaded stud attached to it. A socket shell grips the ball.

Tie-Rod Assembly

The steering arm or lever controls the movement of the driver's side steering knuckle. There must be some method of transferring this steering motion to the opposite, passenger side steering knuckle. This is done through the use of a tie-rod assembly that links the two steering knuckles together and forces them to act in unison.

Brake System

Automobile brakes must be able to stop the car, prevent excess speed when coasting, and hold the vehicle in position when stopped on grades. [9] They are designed so that the braking effort can be varied by the driver to keep the vehicle under control.

Drum Brake

Drum brakes use an internal expanding brake shoe with the lining attached, working within the confines of a rotating brake surface called a brake drum. [10]

Disc Brake

Disc brakes employ a brake disc that rotates with the wheel. The brake disc is usually referred to as a brake rotor. A hydraulically operated caliper is used to force the lining friction material against the braking surface of the rotor for stopping wheel rotation. [11]