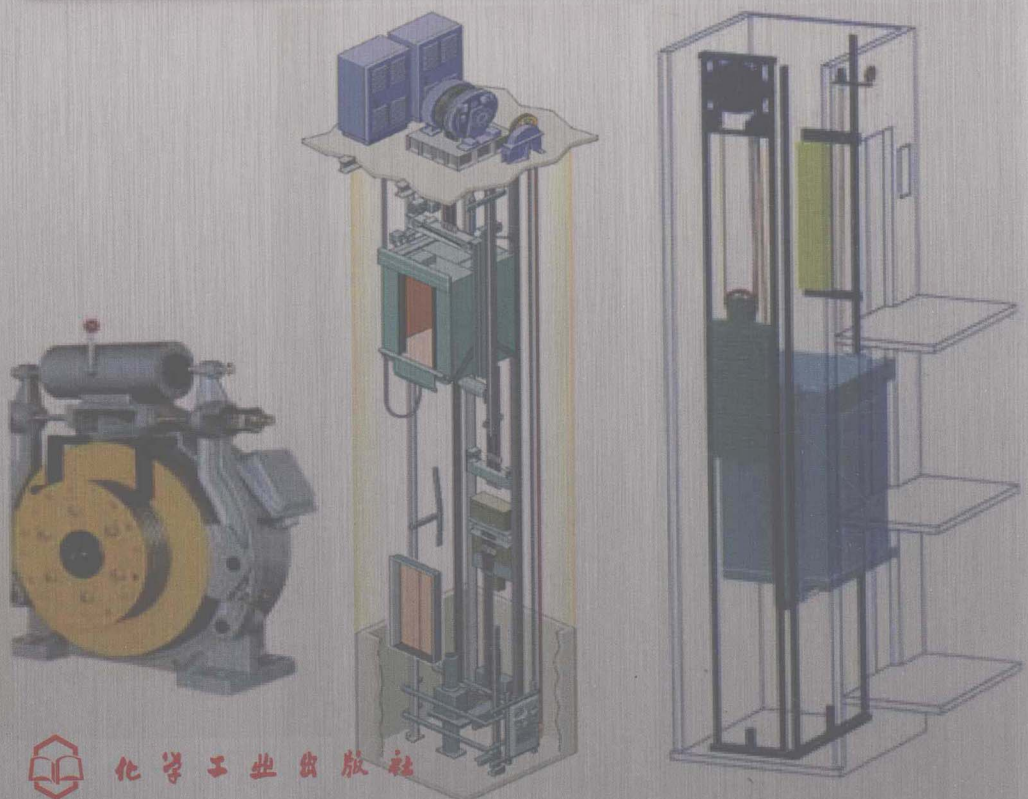
English for Elevator

电梯专业英语

肖伟平　夏龙军　主　编
张　书　吕晓娟　副主编



化学工业出版社

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本书共11章，每章设置内容描述、知识准备、章节内容、自我评价和拓展阅读五个部分，重点介绍电梯的各个环节，涉及电梯（扶梯）结构，电梯安装及维护等多方面内容，同时也介绍了金属加工、焊接、工程制图等与电梯技术相关的专业知识，力求达到贴近工作与生产实际。本书采用大量的图片穿插说明，减少文字篇幅以降低阅读难度。每个章节的拓展阅读，具有一定的趣味性和实用性。

本书可供从事电梯生产、安装及维护技术人员阅读和参考，也可作为高等院校电梯专业及相关从业人员技术培训教材和参考用书。

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前言

Foreword

我国电梯行业的蓬勃发展需要大量的技术人才，无论是生产制造、采购销售还是安装维护及保养等，同时我国电梯业也逐渐与国际接轨，很多电梯企业正在不断地吸收和引进国外的先进理念与先进技术，这对相关人才及技术等的要求提出了更高的挑战，电梯从业人员的英语素质亟待提高。只有掌握一定的专业英语，才能与国外电梯科研及技术人员进行相关的技术交流或贸易，更好地学习和掌握国外先进技术。中山职业技术学院作为国内率先成立电梯专业的院校，在人才培养、实训基地等方面做了大量的探索和实践。本书旨在提高电梯从业人员、高等院校电梯专业学生专业英语的阅读能力，使读者能扩充知识面，为专业学习服务，提高读者的综合素质和未来继续学习及发展的能力。为读者将来及时学习国内外电梯专业领域的新知识，了解行业发展新动向打下坚实基础。

全书共分11章，每章设置内容描述、知识准备、章节内容、自我评价和拓展阅读五个部分，重点介绍电梯的各个环节，涉及电梯（扶梯）结构，电梯安装及维护等多方面内容，同时也介绍了金属加工、焊接、工程制图等与电梯技术相关的专业知识，力求达到贴近工作与生产实际。本书采用大量的图片穿插说明，减少文字篇幅以降低阅读难度。每个章节的拓展阅读，具有一定实用性。本书内容通俗易懂、语言简练，趣味性强，选材新颖，覆盖面较广，可供从事电梯生产、安装及维护技术人员阅读和参考，也可作为高等院校电梯专业及相关从业人员技术培训教材和参考用书。

本书由肖伟平、夏龙军主编，张书、吕晓娟副主编，肖伟平负责全书统稿。具体编写分工如下：肖伟平编写第1至第3章，夏龙军编写第4至第8章，潘斌、屈省源编写第9章，张书编写第10章，吕晓娟编写第11章。

本书在编写过程中参考了相关的文献资料，同时得到了专业教研室各位老师的大力支持，并提出了许多宝贵意见，使本书得以顺利完成，在此一并深表感谢。由于本书与以往的专业英语教材相比，可以直接借鉴的资料不多，另外编写时间和水平均有限，书中不妥之处在所难免，敬请广大专家和读者批评指正。

编者

2012年5月

目录 Catalogue

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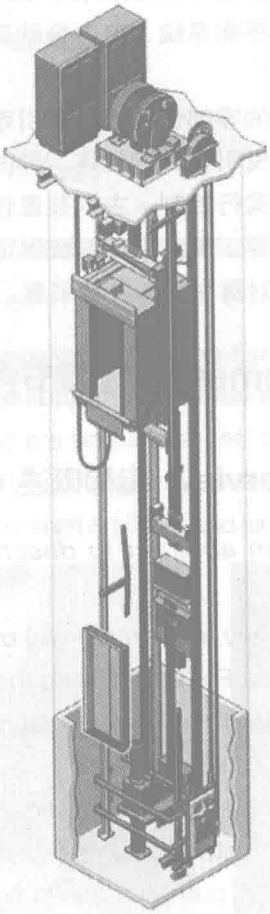
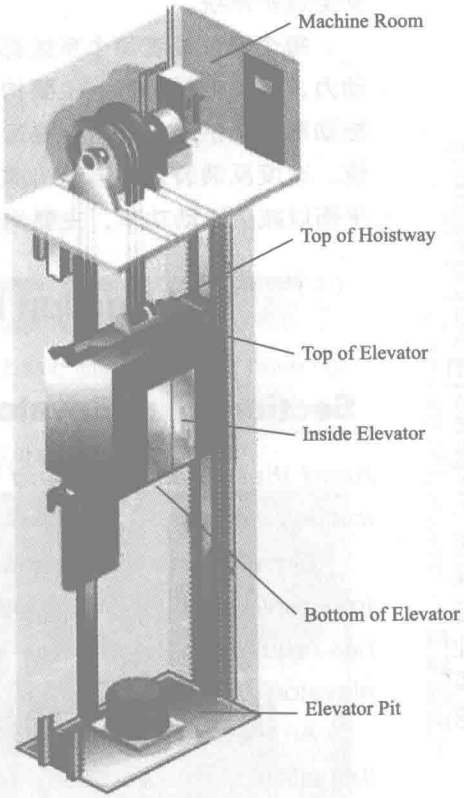
Chapter 1

Structure of Elevator I
电梯结构 I





【Content Description】/【内容描述】

电梯是机电技术高度结合的特种设备，了解电梯的结构是制造、安装、使用和维护的前提。根据不同的标准，电梯有不同的种类，本书以目前使用最多的曳引型电梯为例，通过大量插图，对电梯进行介绍。

本章共设置了三节，电梯概述，曳引系统和重量平衡系统。通过本章的学习，了解电梯四大空间和八大系统的英语表达，掌握曳引系统、电力拖动系统和重量平衡系统中曳引机、制动器、对重和钢丝绳等常见零部件的英语词汇，能够翻译和看懂一般的电梯文章。

【Related Knowledge】/【知识准备】

典型曳引电梯的结构可以概括为四大空间八大系统：从位置或空间上可以分为机房部分、井道－底坑部分、轿厢部分和层站部分，从功能上分为曳引系统、导向系统、轿厢系统、门系统、重量平衡系统、电力拖动系统、电气控制系统和安全保护系统。

每个部分或者每个系统都由众多的零部件构成。曳引系统主要是输出与传递动力、驱动电梯运行，主要构件包括曳引机、钢丝绳、导向轮、反绳轮等；电力拖动系统提供动力、对电梯运行速度实行控制，主要装置包括曳引电机、供电系统、速度反馈装置、电动机调速装置等；重量平衡系统保证曳引轮两端重量接近平衡以减少驱动功率，主要构件包括对重和重量补偿装置。

【Section Implement】/【章节内容】

Section ❶ Elevator Overview 电梯概述

Read these passages and write an abstract to describe the structure of traction elevator.

Elevators are a standard part of any tall commercial or residential building. In recent years, the introduction of the Federal Americans with Disabilities Act has required that many two-story and three-story buildings be retrofitted with elevators.

An elevator, lift in British English, is a type of vertical transport equipment that efficiently moves people or goods between floors of a building. Elevators are generally powered by electric motors or pump hydraulic fluid. In the application

of vertical transportation systems, a major decision is which drive system to use, hydraulic or traction? Each type has characteristics which makes it particularly well suited for a specific application. In general, hydraulic elevators (as shown in Figure 1–1) are suitable for low–rise buildings (up to 6 floors) whereas, the roped elevators (or "traction elevators") are best suited to higher buildings.

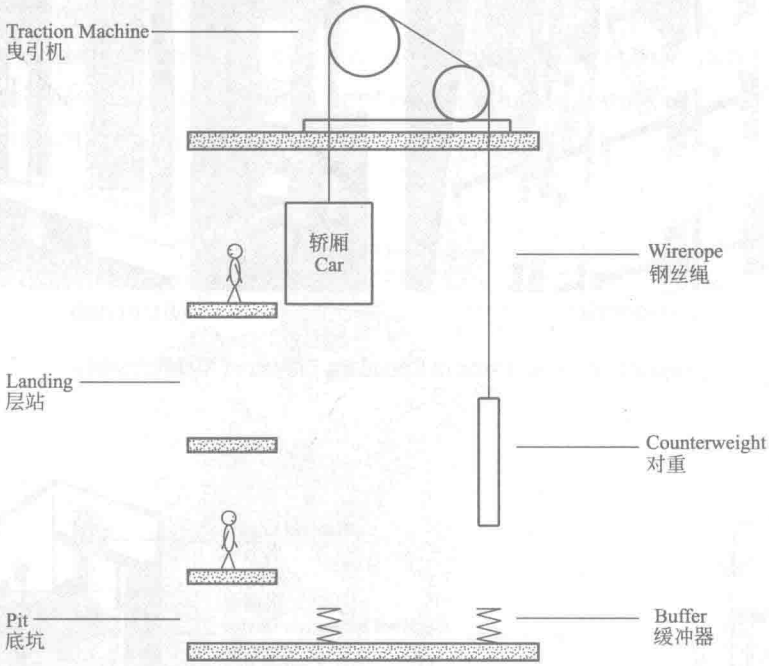
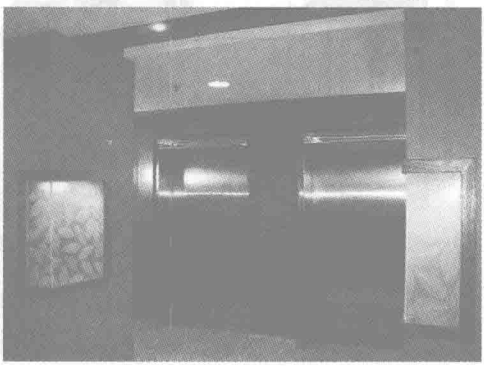


Figure1–1 Hydraulic Elevator（液压电梯）

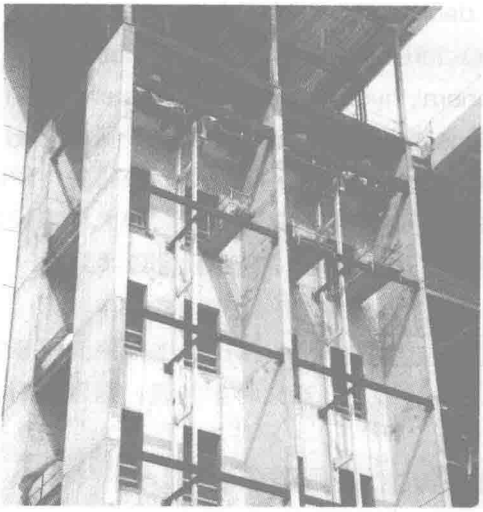
Traction elevators are the most popular type nowadays and are driven by the traction between the suspension ropes and the drive sheaves.

Elevators themselves are simple devices, and the basic lifting systems have not changed much in over 50 years. In space, elevators can be considered to be composed of four parts: machine room, shaft & pit, car and landing (as shown in Figure 1–2).

(a) Machine Room(机房)



(b) Landing (层站)



(c) Shaft(井道)

(d) Car (轿厢)

Figure1-2 Four Parts of Space for Elevator (电梯四大空间)

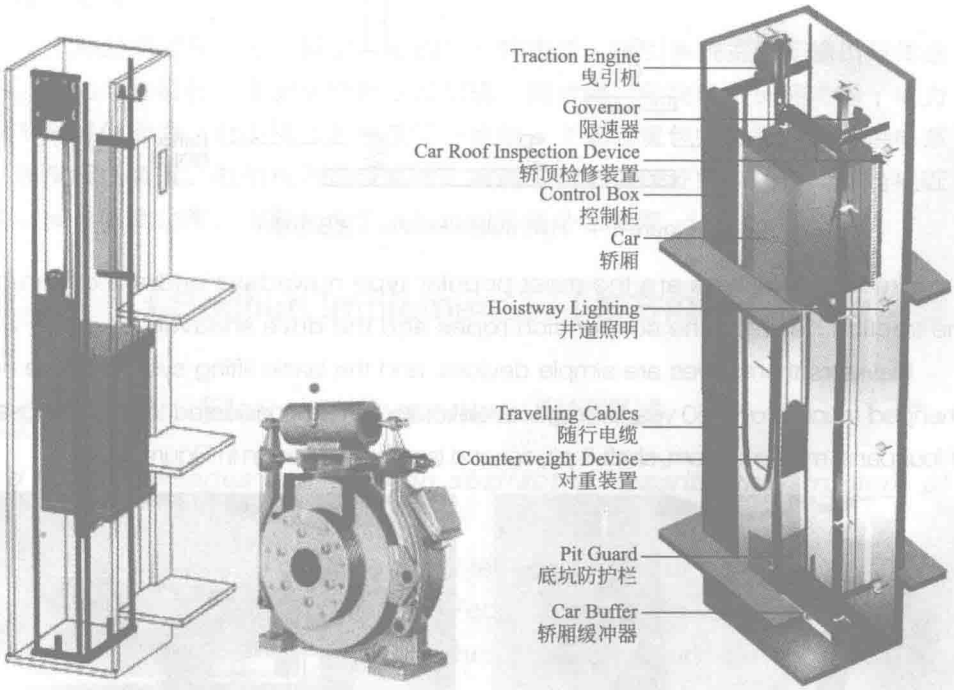


Figure1-3 Machine-Room-Less (MRL) Elevator (无机房电梯)

The machine-room-less elevator (as Figure 1-3 shows) is the result of technological advancements. These newly designed permanent magnet

motors (PMM) allow the manufacturers to locate the machines in the hoistway overhead, thus eliminating the need for a machine room over the hoistway. This design has been utilized for at least 15 years and is becoming the standard product for low to low-mid rise buildings. It was first introduced to the U.S. market by KONE.

According to their function, elevator is made up of eight systems: traction system, guide system, car system, door system, weight balance system, electrical drive system, electrical control system and safety protection system (as Figure 1-4 shows).

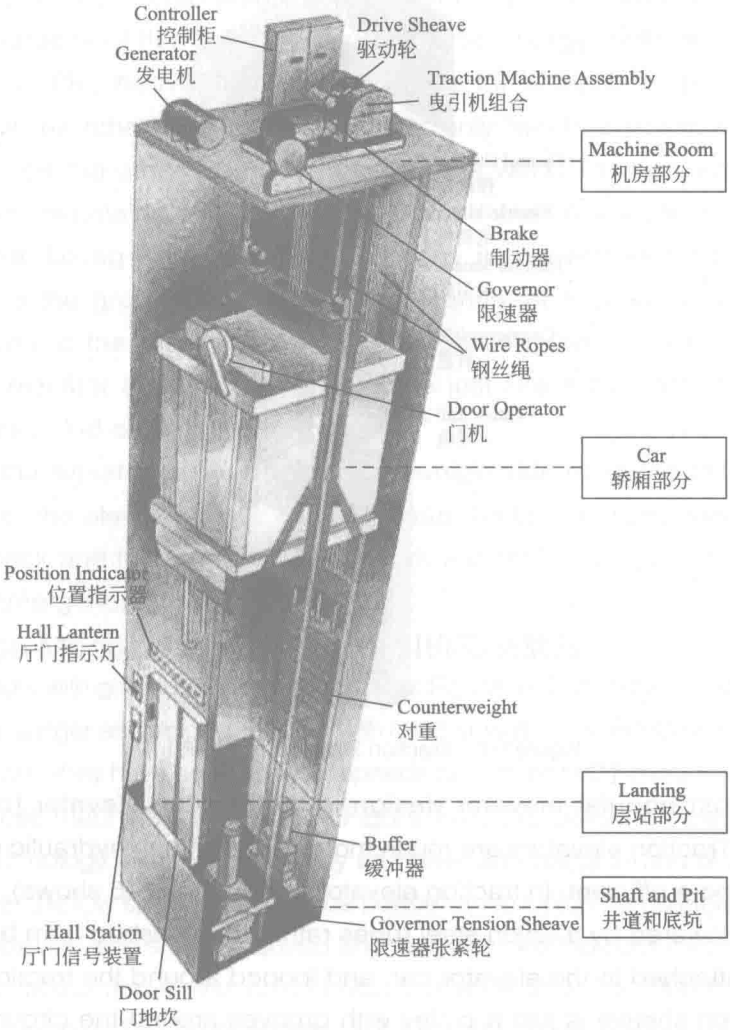


Figure1-4 Traction Elevator Overview (曳引电梯总览)

Notes and Expressions

1. commercial or residential building 商业或住宅建筑
2. retrofit ['retrəufit] *vt.* 改进；更新；改装 *n.* 式样翻新
3. PMM（permanent magnet motor）永磁电机
4. MRL（Machine-Room-Less）elevator 无机房电梯
5. traction ['trækʃən] *n.* 曳引；牵引

Section ❷ Traction System 曳引系统

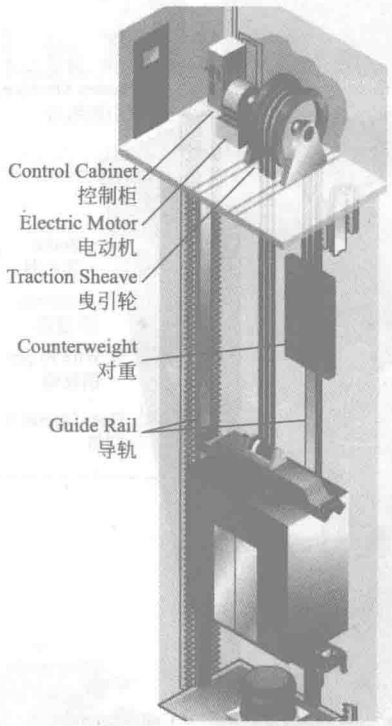


Figure1-5 Traction System（曳引系统）

The most popular elevator design is the traction elevator (or "roped elevator"). Traction elevators are much more versatile than hydraulic elevators, as well as more efficient. In traction elevators (as Figure 1-5 shows), the car is raised and lowered by traction steel ropes rather than pushed from below. The ropes are attached to the elevator car, and looped around the traction sheave (3). A traction sheave is just a pulley with grooves around the circumference. The sheave grips the hoist ropes, so when you rotate the sheave, the ropes

move too.

The sheave is connected to an electric motor (2). When the motor turns one way, the sheave raises the elevator; when the motor turns the other way, the sheave lowers the elevator. In gearless elevators, the motor rotates the sheaves directly. In geared elevators, the motor turns a gear train that rotates the sheave. Typically, the sheave, the motor and the control cabinet(1) are all housed in a machine room above the elevator shaft.

The ropes that lift the car are also connected to a counterweight (4), which hangs on the other side of the sheave. The counterweight weighs about the same as the car filled to 40–percent capacity. In other words, when the car is 40 percent full, the counterweight and the car are perfectly balanced.

The purpose of this balance is to conserve energy. With equal loads on each side of the sheave, it only takes a little bit of force to tip the balance one way or the other. Basically, the motor only has to overcome friction — the weight on the other side does most of the work. To put it another way, the balance maintains a near constant potential energy level in the system as a whole. Using up the potential energy in the elevator car (letting it descend to the ground) builds up the potential energy in the weight (the weight rises to the top of the shaft). The same thing happens in reverse when the elevator goes up. The system is just like a see–saw that has an equally heavy kid on each end.

Both the elevator car and the counterweight ride on guide rails (5) along the sides of the elevator shaft. The rails keep the car and counterweight from swaying back and forth, and they also work with the safety system to stop the car in an emergency.

▪ Traction Machine and Brake 曳引机和制动器

Elevators with geared traction machine (as Figure 1–6 shows) are normally used on both passenger and freight elevators with rated speed up to 350 ft/min (≈ 1.78m/s). In a few cases, they have been used for speeds as high as 500 ft/min (≈ 2.54m/s).

Gearless machine (as shown in Figure 1–7) are based on the permanent magnet technology with high efficiency and have an energy saving of about 60%. They deliver the low speed, high torque performance which completely eliminated the gear box with less space required and totally smooth ride comfort travel.

Gearless traction elevators can reach speeds of up to 2000 ft/min (10 m/s), or even higher. The components are the same as previously described for geared units except for the driving machine.

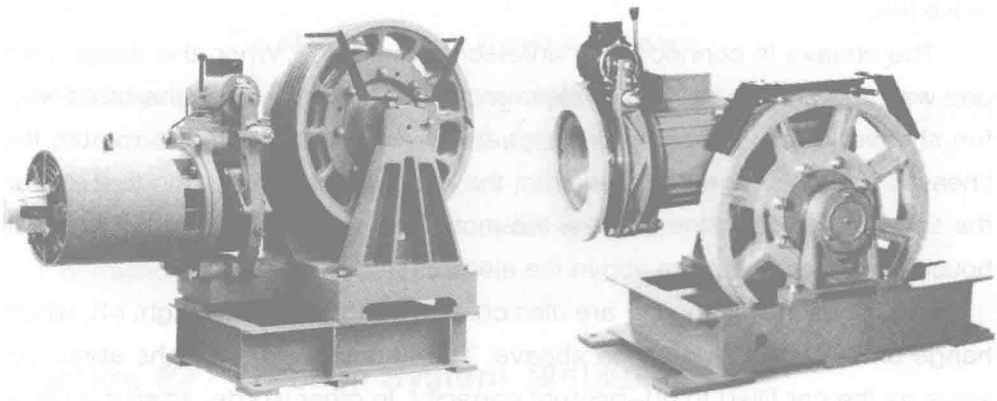


Figure1-6 Geared Traction Machine（齿轮曳引机）

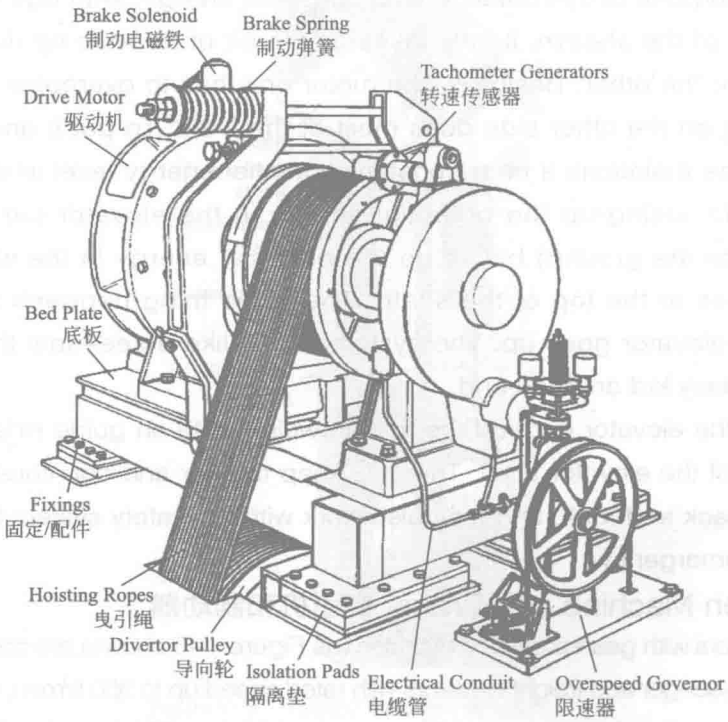


Figure1-7 Gearless Traction Machine（无齿曳引机）

The most common elevator brake is made up of a compressive spring assembly, brake shoes with linings, and a solenoid assembly. When the solenoid is not energized, the spring forces the brake shoes to grip the brake drum and induce a braking torque. The magnet can exert a horizontal force for the break release. This can be done directly on one of the operating arms or through a linkage system. The break is pulled away from the shaft and the

velocity of the elevator is resumed.

In order to improve the stopping ability, a material with a high coefficient of friction is used within the breaks, such as zinc bonded asbestos. A material with too high a coefficient of friction can result in a jerky motion of the car. This material must be chosen carefully.

For both geared and gearless, the brake is released electrically and applied when electric power is removed. This brake is usually an external drum type and is actuated by spring force and held open electrically, a power failure will cause the brake to engage and prevent the elevator from falling. The drawings in Figure1–8 illustrate typical elevator brakes.

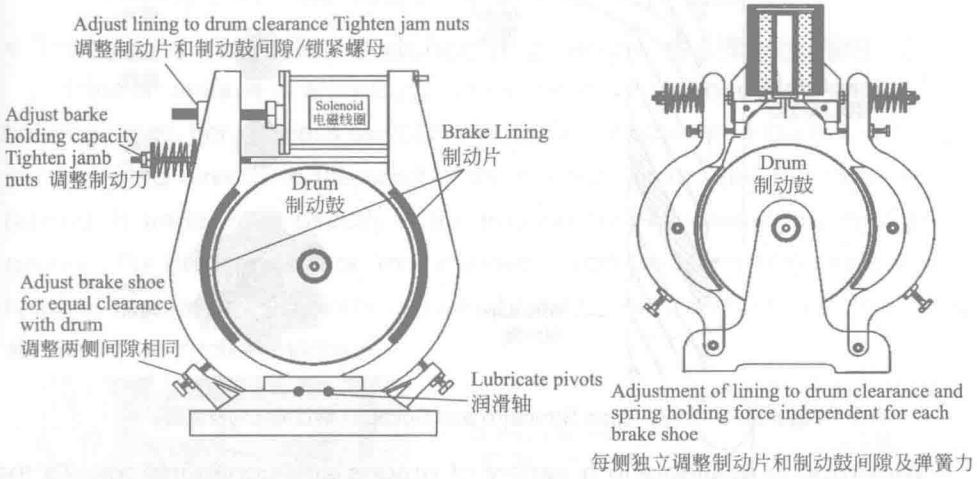


Figure1–8 Elevator Brake (电梯制动器)

▪ Traction Wire Rope 曳引钢丝绳

Due to its construction and the structure consisting of many individual steel wires, steel wire rope offers advantages that clearly qualify it for use on elevators. Its benefits are its redundancy and the capacity to identify the possibility of the end of service life or (preferably) the correct time for discarding the rope before its condition becomes dangerous by means of externally visible criteria such as wire breakages.

Wire rope (as Figure 1–9 shows) is made of wire strands and a core. The center wire is a round shaped wire used as the body member. Around this body member a group of wires are helically laid to form a strand. The strands are supported by the core, thus making up what we refer to as the wire rope diameter, which is utilized in manufacturing.

The greater the number of wires in a strand the more flexibility in the wire

rope. The lower or less amount of wires in a strand the stiffer the wire rope. The center core may be made with a polypropylene Fiber Center (FC) or with a steel Independent Wire Rope Center (IWRC).

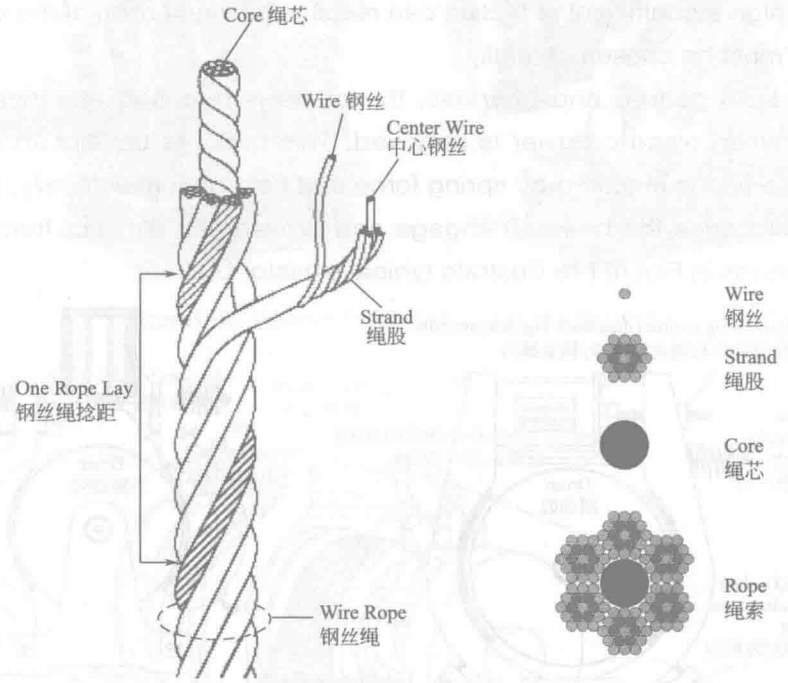


Figure1-9 Wire Rope Structure and Section (钢丝绳结构及截面)

Wire rope is available in a variety of grades and configurations. To the layman, the critical factors in selecting a rope are breaking strength and diameter (measurement methods see Figure 1-10).

An adequate factor of safety is crucial in wire rope use. For hoist rope of dumbwaiter, the recommended safety factor is 10 : 1. In other words, if the load weighs one ton, the wire rope used must have a minimum ultimate breaking strength of ten tons.

Figure1-10 Wire Rope Diameter Measurement Method (钢丝绳直径测量方法)

Rope diameter is important for compatibility with rigging hardware. In