·全国纺织机电专业规划教材·

纺织机电专业英语

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中国纺织出版社

全国纺织机电专业规划教材

纺织机电专业英语

Specialized English for Textile Electromechanics

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内 容 提 要

本教材由机械、机电技术、纺织机电技术与数控机床四大部分组成，共含15个章节，各章节包括课文、生词、短语和练习。教材中的大部分内容选自原版英文教材与资料，结合高职高专的教学要求及学生的实际情况，突出实践性。书后附参考译文及习题答案，便于帮助学生理解与核查自己所掌握的内容。该书配有课件（见网站），以幻灯片的形式反映书中重要定义与概念，并由外教朗读。

本书为高职高专纺织机电技术专业英语教材，同时适合其他机电类、电子电气类、机械类等相关专业的学生使用，也可供相关专业的工程技术人员参考。

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序

在全国职业教育事业迅速发展的形势下，纺织教育人才培养模式从20世纪90年代的大纺织格局逐步转变为现在的“厚基础”、“宽口径”，重点培养跨学科的复合型人才。因此，各纺织职业院校的专业方向设置越来越丰富、越来越贴近市场、越来越实用。其中，“新型纺织机电技术”专业是各纺织院校近几年拓展的主要方向之一，主要是为适应日新月异的纺织机械自动化控制技术，为培养面向生产与管理一线的、具有较强新型纺织机电一体化设备运行、维护、管理、检修能力的高技能人才而开设的。

新型纺织机电技术以机电一体化、电气自动化、数控技术为主干专业，以纺织机械和纺织电气技术为特色。作为一门新兴的学科和专业，由于学科的演变和各院校的特色发展，致使各职业院校关于此专业的教学计划和教材差别较大，大部分院校一直使用相关课程的讲义。为此，由中国纺织出版社主办、南通纺织职业技术学院协办的“纺织机电专业教材建设研讨会”于2008年3月在南通顺利召开，在十余所院校相关老师认真讨论专业教学计划的基础上，完成了首批纺织机电专业规划教材十余本，以期满足各院校纺织机电专业教学的需要。

在众多单位、院校、专家和学者的共同努力下，本套教材基本上涵盖了纺织机电专业的部分基础课和大部分专业课。由于本套教材在全国还属于首次编著，缺乏经验，不足之处在所难免，希望广大同行、有关专家、教师学者和使用者及时提出宝贵的意见，以期提高这套教材的整体质量。

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2008年8月

前言

《纺织机电专业英语》是一本为新型纺织机电技术专业的高职学生编写的专业英语教材。教材中除了介绍纺织设备外，还介绍了大量机电方面的知识，故此教材既适用于新型纺织机电技术专业，又适用于其他机电类、电子电气类、机械类等相关专业。

本教材分为机械、机电技术、纺织机电技术与数控机床四大部分，主要内容由课文、词汇表及对应练习三部分组成。

本教材突出应用性和实践性，注重结合专业知识，在结构设计和内容编写上充分注意到专业基础，循序渐进，突出专业英语应用能力的培养，相关章节配备了插图，全书后附加了词汇表，以便快速查阅和检索。

本教材以最新的机电英语教学大纲为依据，在参考国外最流行的机电英语教学资料的基础上编写而成，对知识点的阐述参照权威的著作，力争做到讲解清晰、表述规范。所编写的英文内容全部配有中文翻译。各小节后附有练习题和参考答案。配套课件中的英语内容由澳大利亚Maggie女士朗读，可供听力及语言训练。建议教学上采用讲、练结合的方式，尽量做到精讲多练，在练习中巩固所学知识。

主编单敏（南通纺织职业技术学院）负责机电技术与纺织机电技术部分的编写、全文的中文翻译整理及课件制作，主编孙凤鸣（南通纺织职业技术学院）负责机械与数控机床部分的编写，副主编郝小星（太原理工大学）负责全文的文字校对、图表制作及习题答案的整理，参编李金喜（南通纺织职业技术学院）、李扬（陕西纺织服装职业技术学院）负责各章节的配套练习编写，Maggie女士对全文进行审稿。

我们希望《纺织机电专业英语》一书能以其自身的特色更方便、更有效地服务于高职高专教学，同时我们也恳请广大师生在使用过程中对本教材提出宝贵意见，以便不断完善。

编者

2009年1月

目录

Part I Mechanics(机械)

1.1 Connecting Bar Mechanism(连杆机构)

1.1.1 Hinge Joint Four - bar Mechanism (铰接四杆机构)

The plane four - bar mechanism whose kinematic pairs are revolute pairs is called the hinge joint four - bar mechanism. As picture 1.1 shows, it is the most fundamental type of plane four - bar mechanism. Other types of plane four - bar mechanism may be regarded as the evolution of the fundamental type. In the mechanism, component 4 is the stander. Component 1 and 3 are the side links. Component 2 is the connecting bar. The side link that rotates in a loop is called the brace. The side link that cannot rotate in a loop is called the sway rod or swing stem. If the two components may be connected by a revolute pair at a point and they may rotate in a loop around the point, the revolute pair is called the rotary pair. Otherwise, it is called the swing pair.

It is thus named due to the two side links' movement features of plane hinge joint four - bar mechanism. For instance, when one side link is brace, while the other is sway rod, the mechanism is called brace - sway - rod mechanism. When the two side links are both braces, it is called double - brace mechanism. When the two side links are both sway rods, it is called double - sway - rod mechanism.

1.1.1.1 Brace - sway - rod mechanism(曲柄摇杆机构)

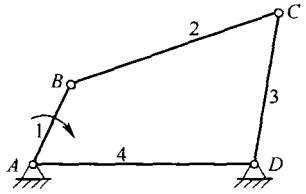
One of the two side links of the brace - sway - rod mechanism is the driving part. And the other is the driven part. When the brace is the driving part, the brace - sway - rod mechanism converts the rotation of the driving part brace into the sway or swing of the driven part sway rod.

1.1.1.2 Forward lain brace - sway - rod mechanism(正置曲柄摇杆机构)

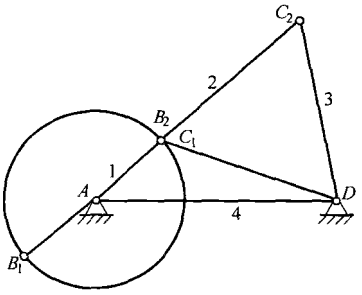
Picture 1.2 shows one type of brace - sway - rod mechanism. Brace 1 rotates around point A. When the brace rotates for one loop, the sway rod sways to and fro once around point D. The tilt angle is $\angle C_1D\ C_2$, C_1D and C_2D are the two utmost locations of the sway rod. Link the points C_1 and C_2 on the two utmost locations of the sway rod. In addition, prolong line segment C_1C_2 to pass through the rotating center of the brace. The type of brace - sway - rod mechanism is called the forward lain brace -sway - rod mechanism.

1.1.1.3 Forward biased lain brace - sway - rod mechanism(正偏置曲柄摇杆机构)

Picture 1.3 shows the forward biased lain brace -sway - rod mechanism. Link the points C_1 and



Picture 1.1 Hinge joint four – bar mechanism

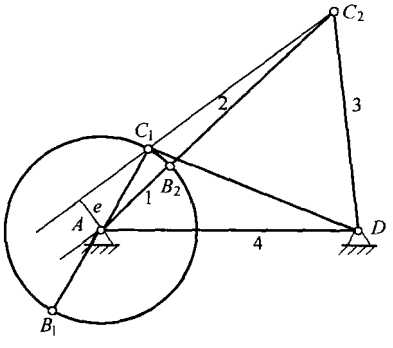


Picture 1.2 Forward lain brace – sway – rod mechanism

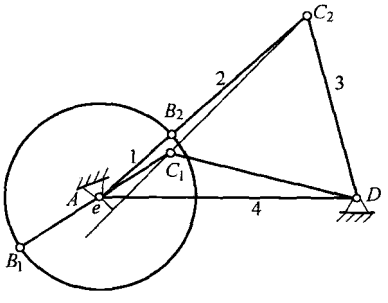
C_2 on the two utmost locations, and prolong the line segment C_1C_2. However, the extension line does not pass through the rotating center of the brace. The distance between the extension line C_1C_2 and the rotating center A of the brace is e, which is called eccentricity distance. The TP 500 rapier loom, jet looms and the beating – up mechanism of the K 261 silk loom all adopt the forward biased lain brace – sway – rod mechanism.

1.1.1.4 Negative biased lain brace – sway – rod mechanism(负偏置曲柄摇杆机构)

Picture 1.4 shows the negative biased lain brace – sway – rod mechanism. Link the points C_1 and C_2 on the two utmost locations, and prolong the line segment C_1C_2. However, the extension line does not pass through the rotating center of the brace. The distance between the extension line C_1C_2 and the rotating center A of the brace is e, which is called eccentricity distance. The extension line between the two utmost locations of the forward biased lain brace – sway – rod mechanism passes through the outer flank of the stander AD. The tie line between the two utmost locations of negative biased lain brace – sway – rod mechanism passes through the tie line of the stander. The H 212 woolen loom and the beating – up mechanism of the 1515 cotton loom both adopt the negative biased lain brace – sway – rod mechanism.



Picture 1.3 Forward biased lain brace – sway – rod mechanism



Picture 1.4 Negative biased lain brace – sway – rod mechanism

1.1.1.5 Double – sway – rod mechanism(双摇杆机构)

Picture 1.5 shows another type of hinge joint four – bar mechanism. The two side links cannot ro-

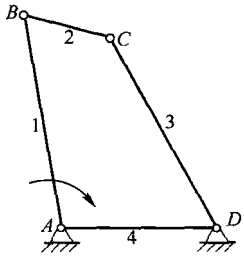
tate in a loop. So the two side links are both sway rods. This type of hinge joint four－bar mechanism is called the double－sway－rod mechanism, whose driving part and driven part both swing.

1.1.1.6 Double－brace mechanism(双曲柄机构)

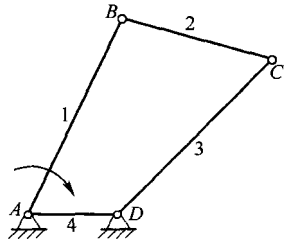
In the plane hinge joint four－bar mechanism shown in picture 1.6, the two side links 1 and 3 may both rotate in a loop. That is to say, the two side links are both braces. This type of plane hinge joint four－bar mechanism is called the double－brace mechanism. Generally, the transmitting ratio of the driving brace and the driven brace is a variable force. That is, when the driving brace rotates at constant speed, the driven brace rotates at variable speeds.

1.1.1.7 Forward parallelogram mechanism(正平行四边形机构)

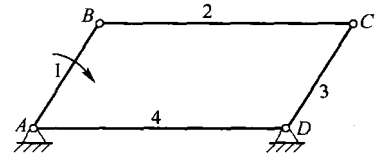
In the plane hinge joint four－bar mechanism shown in picture 1.7, the lengths of components 1 and 3 are the same. The lengths of components 2 and 4 are equivalent. The rotating directions of components 1 and 3 are constantly the same. In the course of the movement, the four bars constantly constitute the parallelogram. This type of plane hinge joint four－bar mechanism is called the forward parallelogram mechanism. The rotating directions of the two side links of the forward parallelogram mechanism are the same. Furthermore, their rotating speeds are constantly equivalent. It is a type of mechanism that may achieve the fixed transmitting ratio in the connecting bar mechanism. Picture 1.7 shows the driving mechanism of the engine wheel, which is a forward parallelogram mechanism.



Picture 1.5 Double－sway－rod mechanism



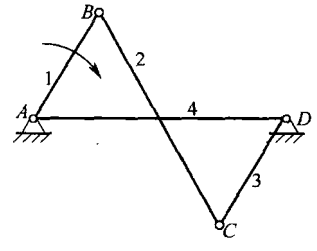
Picture 1.6 Double－brace mechanism



Picture 1.7 Forward parallelogram mechanism

1.1.1.8 Counter parallelogram mechanism(反平行四边形机构)

In the plane hinge joint four－bar mechanism shown in picture 1.8, the lengths of componentsl and 3 are the same. The lengths of components 2 and 4 are equivalent. The rotating directionsof component 1 and 3 are constantly counter to each other. This type of plane hinge joint four－bar mechanism is called the counter parallelogram mechanism. The rotating directions of the two side links of the counter parallelogram are counter to each other. In addition, their rotating speeds are constantly equivalent. It is another type of mechanism that can achieve a fixed transmitting ratio.



Picture 1.8 Counter parallelogram mechanism

Picture 1.8 shows the switching mechanism of the car door in which this type of mechanism is adopted.

Vocabulary

mechanics[mi'kæniks]*n.* 力学,机械学
mechanism['mekənizəm]*n.* 机械,机构,结构
hinge[hindʒ]*n.* 铰链,铰接
bar[bɑ:]*n.* 条,棒,杆
brace[breis]*n.* 支柱,曲柄
plane[plein]*n.* 平面
kinematic[ˌkaini'mætik]*a.* 运动学的,运动学上的
revolute['revəl(j)u:t]*a.* 旋转的(后旋的)
fundamental[ˌfʌndə'mentl]*a.* 基本的,根本的
evolution[i:və'lu:ʃən]*n.* 进化,发展,进展
component[kəm'pəunənt]*n.* 元件,组件,成分
stander[stændə]*n.* 机架
rotate[rəu'teit]*v.* (使)旋转
sway[swei]*n.* 摇动 *v.* 使摇动
rod[rɔd]*n.* 杆,棒
loop[lu:p]*n.* 环,圈,弯曲部分
swing[swiŋ]*n.* 摇摆,*v.* 摇摆,使……旋转,动摇
stem[stem]*n.* 柄,把,导杆
rotary['rəutəri]*a.* 旋转的
biased['baiəst]*a.* 偏的
tilt[tilt]*n.* 倾斜
angle['æŋgl]*n.* 角度
thus[ðʌs]*ad.* 如此,这样,因此,从而
utmost['ʌtməust]*n.* 极限,最大可能
prolong[prə'lɔŋ]*v.* 延长,拖延
segment['segmənt]*n.* 部分
extension[iks'ten ʃən]*n.* 延长,扩充,范围
eccentricity[eksen'trisiti]*n.* 偏心,偏心距
loom[lu:m]*n.* 织布机
transmit[trænz'mit]*v.* 传输,转送,传达
ratio['reiʃiəu]*n.* 比,比率
equivalent[i'kwivələnt]*a.* 相等的 *n.* 相等物
negative['negətiv]*a.* 负的,相反的
variable['vɛəriəbl]*a.* 可变的,易变的 *n.* 变量
constant['kɔnstənt]*a.* 经常的,不变的 *n.* 常数,恒量
parallelogram[ˌpærə'leləgræm]*n.* 平行四边形
switch[switʃ]*n.* 开关,电源的接通或切断 *v.* 转变,切换,摆动,接通或切断电源
flank[flæŋk]*n.* 侧面
constitute['kɔnstitju:t]*v.* 构成,组成
counter['kauntə]*a.* 相反的

Phrases and Expressions

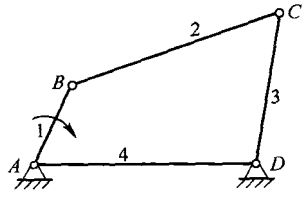
plane four－bar mechanism 平面四杆机构
hinge joint four－bar mechanism 铰接四杆机构
kinematic pair 运动副
revolute pair 转动副
side link 连架杆
sway rod 摇杆
swing stem 摆杆
rotary pair 回转副
swing pair 摆转副
double－brace mechanism 双曲柄机构
double－sway－rod mechanism 双摇杆机构
driving part 主动件
driven part 从动件
forward lain 正置
to and fro 来回
forward biased lain 正偏置
tilt angle 摆角
line segment 线段
rapier loom 剑杆织机
silk loom 丝织机
beating－up mechanism 打纬机构
jet loom 喷气织机
extension line 延长线
eccentricity distance 偏心距

switching mechanism 开闭机构
outer flank 外侧
tie line 连线
woolen loom 毛织机
cotton loom 棉织机
engine wheel 机车车轮
variable force *n.* 变力,变量
negative biased lain 负偏置
brace – sway – rod mechanism 曲柄摇杆机构
in a loop 整圈的

Ⅰ. Check your understanding

Give brief answers to the following questions:

1. what is the hinge joint four – bar mechanism?
2. Introduce the components of the hinge joint four – bar mechanism in the picture.
3. List the basic types of the hinge joint four – bar mechanism.
4. What are the characteristics of the brace – sway – rod mechanism?
5. What are the characteristics of the double – sway – rod mechanism?



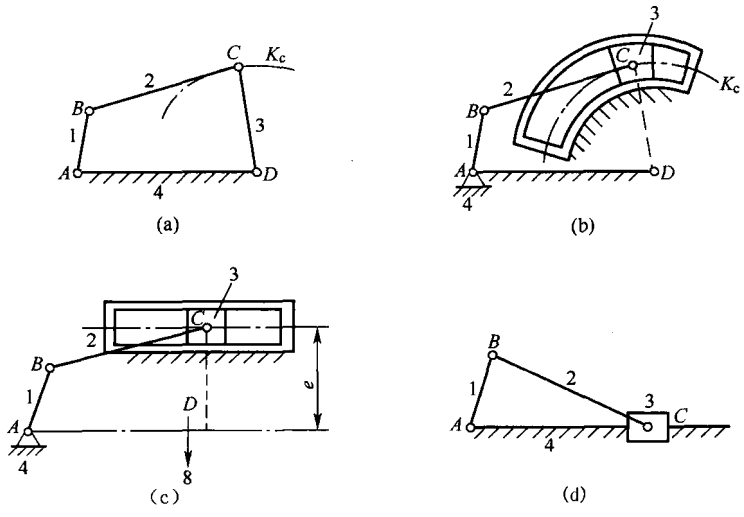
Ⅱ. Match the items listed in the following two columns

stander	平面四杆机构
hinge	回转副
side link	摆杆
sway rod	铰链
swing stem	双曲柄机构
rotary pair	双摇杆机构
plane four – bar mechanism	曲柄
double – brace mechanism	机架
double – sway – rod mechanism	摇杆
brace	连架杆

1.1.2 Slider – crank Mechanism (曲柄滑块机构)

The movement pair may be regarded as the evolution of the revolute pair. In the brace – sway – rod mechanism shown in picture 1.9 (a), 1 is the brace and 3 is the sway rod. The orbit of point C takes point D as the circle center. The bar CD is the radius of circular arc K_c. Currently, we can make the same orbit circular arc gutter K_c on stander 4. Besides, the sway rod 3 is made as an arc slide block to slide in the gutter, which is shown in picture 1.9 (b). Now, the movement of the arc slide block in the arc gutter has completely the same effect as that of the revolute pair D. The circle center of the circular arc gutter K_c equals to the sway center D of the sway rod 3. Its radius is equivalent to CD, the length of sway rod 3. If the radius of arc gutter K_c is increased to infinity, and its circle center D is moved to infinite distance, the arc gutter would become a straight gutter. The slide block 3 in it will do the straight movement repeatedly. As a result, the revolute pair D evolves into the movement pair. The brace – sway – rod mechanism evolves into a four – bar mechanism containing one movement pair, which is called the slider – crank mechanism. It is shown in picture 1.9 (c). Here, e is the dis-

tance from the crank revolving center A to the center line of the straight gutter that passes through point C, which is called the offset distance. When $e \neq 0$, it is called the offset slider – crank mechanism. When $e = 0$, it is called the centric slider – crank mechanism, which is shown in picture 1.9 (d).



Picture 1.9 The revolute pair evolves into the movement pair

Vocabulary

slider['slaidə] *n.* 滑动器
crank[kræŋk] *n.* 曲柄 *v.* 用曲柄启动或转动
orbit['ɔ:bit] *n.* 轨迹,轨道,常轨
radius['reidjəs] *n.* 半径
arc[ɑ:k] *n.* 弧
centric['sentrik] *a.* 中心的,中央的
block[blɔk] *n.* 块,模块
offset['ɔ:fset] *n.* 偏移
gutter['g ʌtə] *n.* 槽
infinity[in'finiti] *n.* 无限大,无限
infinite['infinit] *a.* 无限的,无穷的
evolve[i'vɔlv] *v.* 进展,进化,演变

Phrases and Expressions

slider – crank mechanism 曲柄滑块机构
offset distance 偏距
movement pair 移动副
circle center 圆心
circular arc 圆弧
infinite distance 无穷远
centric slider – crank mechanism 对心曲柄滑块机构
slide block 滑块
offset slider – crank mechanism 偏置曲柄滑块机构

I. Check your understanding

Give a brief answer to the following question:

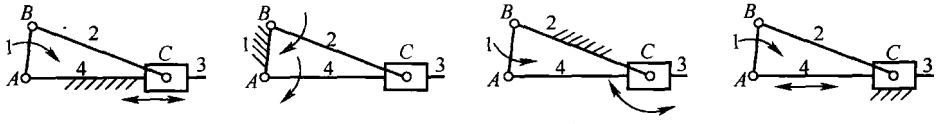
What is the difference between the slider – crank mechanism and the brace – sway – rod mechanism?

Ⅱ. Match the items listed in the following two columns

block	移动副
slider – crank mechanism	槽
movement pair	对心曲柄滑块机构
offset distance	块,模块
gutter	轨道
circular arc	圆弧
centric slider – crank mechanism	曲柄滑块机构
orbit	曲柄摇杆机构
crank	偏距
brace – sway – rod mechanism	曲柄

1.1.3 Guide – bar Mechanism and Swing – block Mechanism (导杆机构和摇块机构)

Convert one revolute pair of brace – sway – rod mechanism into the movement pair. Picture 1.10 shows a mechanism that contains one movement pair. Taking different member bars as standers, the slider – crank mechanism, the rotary guide – bar mechanism($L_1 < L_2$), the sway guide – bar mechanism($L_1 > L_2$), the crank – swing – block mechanism and the movement guide – bar mechanism (It is also called the fixed – block mechanism) come into being.

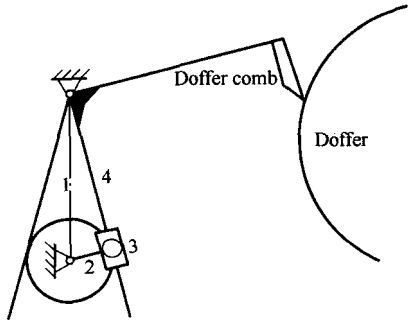


(a) slider–crank mechanism (b) rotary guide–bar mechanism (c) swing–block mechanism (d) movement guide-bar mechanism

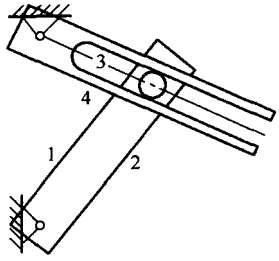
Picture 1.10 The plane four – bar mechanism containing one movement pair

Picture 1.11 shows the doffer comb mechanism in the carding part of the B272 and B271 type worsted card. In this picture, stander 1, crank 2, slider block 3 and sway guide – bar 4 comprise the typical sway guide – bar mechanism. When the crank rotates, the doffer comb sways and peels the web from the doffer.

Picture 1.12 shows the tension dancer rools sway mechanism of the Sucker dressing machine made in Germany. The mechanism is composed of sway bar 2, pin bolt 3 (slider block), guide – bar 4 and stander 1. When tension changes, sway bar 2 rotates. Guide – bar 4 is made to sway by the pin bolt, which is connected with the potentiometer. When guide – bar 4 sways, the resistance and output voltage signal of the potentiometer change. Finally, the rotary speed of the loom beam is changed and the tension is guaranteed to be aflush.



Picture 1.11 The sway guide－bar mechanism used in comber



Picture 1.12 The sway guide－bar mechanism used in the dressing machine

Vocabulary

doffer[ˈdɔfə]*n.* 道夫
comb[kəum]*n.* 梳,精梳 *v.* 梳毛
comber[ˈkəumə]*n.* 梳毛机
carding[ˈkɑ:diŋ]*n.* 用梳刷梳
peel[pi:l]*v.* 削……皮,剥落
web[web]*n.* 网,毛网
tension[ˈtenʃən]*n.* 张力,拉力
pin[pin]*n.* 销子,拴
bolt[bəult]*n.* 螺钉
potentiometer[pəˌtenʃiˈɔmitə]*n.* 电位计,分压计
resistance[riˈzistəns]*n.* 阻力,电阻
output[ˈautput]*n.* 输出,输出功率 *vt.* 输出
voltage[ˈvəultidʒ]*n.* 电压
signal[ˈsignl]*n.* 信号 *v.* 向……发出信号
beam[bi:m]*n.* 轴,横梁
guarantee[ˌgærənˈti:]*v.* &*n.* 保证,确保
aflush[əˈflʌʃ]*a.* 均匀的

Phrases and Expressions

guide－bar 导杆
member bar 杆件
doffer comb 道夫斩刀
crank－swing－block mechanism 曲柄摇块机构
movement guide－bar 移动导杆
worsted card 精纺梳毛机
dressing machine 浆纱机
Sucker dressing machine 祖克浆纱机
loom beam 浆轴
pin bolt 销钉
dancer rools 调节辊

Ⅰ. Check your understanding

Give a brief answer to the following question:

How is the sway guide－bar mechanism used in the comber ?

Ⅱ. Match the items listed in the following two columns:

guide－bar	浆纱机
member bar	精纺梳毛机
crank－swing－block mechanism	浆轴