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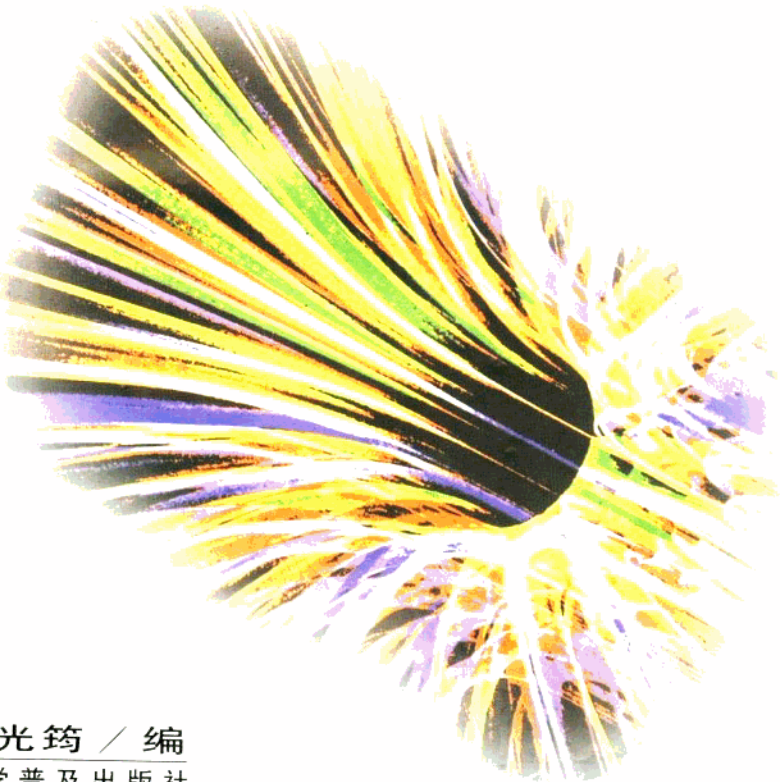
ew Selections of Popular Science & Technology

新编英语科普文选

第一册



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本书导读

我们告别了闭关锁国的时代，跨入了全面对外开放的崭新时代。世纪之交，全球经济一体化的大趋势已经形成。外语作为开展国际交流的重要工具，同计算机技术一样，已成为当代青年迈进新世纪大门的通行证。

《新编英语科普文选》系列读物由清华大学长期从事科技英语教学的史光筠教授主编。内容主要选自美国有关新技术及相关的基础材料。编写过程中吸收了20年来国内外语言学研究的最新成果，讲解和注释强调语言、修辞、记忆术兼顾，读与写兼顾的结合法。本读物具有选材新，编写方法新，图文并茂的特点，可满足信息时代人们提高科技英语水平和汲取、充实新知识的双重需要。

大学学生阅读本书，可弥补学校教学之不足，丰富科技英语阅读经历。对于在职读者本书则不仅有利于提高科技英语水平，适应工作需要，也是通过职称外语考试的好帮手。

本分册收录了有关力学，信息、计算机和通信及环保和能源方面的短文21篇。

Content
目　　录

Part Ⅰ　Mechanics
第一部分　力学

Section 1　Why is the Front Fork of Your Bike Bent?（Ⅰ）…… (1)
自行车的前叉为什么是弯的?（Ⅰ）

Section 2　Why is the Front Fork of Your Bike Bent?（Ⅱ）…… (8)
自行车的前叉为什么是弯的?（Ⅱ）

Section 3　Elastic Instability …… (15)
弹性失稳现象

Section 4　Bending and the Rigidity of Beams …… (23)
弯曲和梁的刚度

Section 5　Centrifugal Sections …… (33)
离心式横截面——可很好地抵御压杆弯曲

Section 6　The Rolling Wheel—The Gyroscopic Stabilizer …… (40)
滚动着的轮子——自行车的陀螺仪式稳定器

Section 7　Two Coarse Scales Make up One Precise Ruler …… (48)
两列粗刻度做成一把精密的量尺

Part Ⅱ Information, Computing and Communications
第二部分 信息、计算机和通信

Section 8 Bits and Atoms …… (56)
比特和原子
Section 9 What is a Bit, Anyhow? (Ⅰ) …… (66)
比特究竟是什么?(Ⅰ)
Section 10 What is a Bit, anyhow? (Ⅱ) …… (74)
比特究竟是什么?(Ⅱ)
Section 11 Data compression(Ⅰ): The Demand …… (83)
数据压缩(Ⅰ):需求
Section 12 Data compression(Ⅱ): Compressibility …… (90)
数据压缩(Ⅱ):可压缩性
Section 13 Error Correction Basics: Single Error Detecting Codes …… (97)
纠错基础知识:单错纠正码
Section 14 Human Cognition and Language—Digital or Analog? …… (106)
人类的认知和语言——数字式的还是模拟式的?

Part Ⅲ Environment and Energy
第三部分 环境和能源

Section 15 Sustainable Development or Malthusian Principle? …… (116)
可持续发展,还是马尔萨斯原理?

Section 16 Can We Desert Earth and Live Elsewhere in the Universe? …… (124)
我们能否抛弃地球而到宇宙间别的地方去住?

Section 17 The Problems of Planet-Earth(Ⅰ):The Biosphere or Ecosphere …… (132)
地球这个行星的问题(Ⅰ):生物圈即生态圈

Section 18 The Problems of Planet-Earth(Ⅱ):The Gaseous Cycles …… (139)
地球这个行星的问题(Ⅱ):气体循环

Section 19 The Sedimentary Cycle(Salt Cycle)…… (149)
沉积物的循环(盐的循环)

Section 20 The Hydrological(Water) Cycle …… (155)
水循环

Section 21 Limited Resources Demand Controlled Development …… (164)
有限的资源要求有控制的发展

附录…… (172)

一般参考文献…… (184)

本书所采用的主要符号一览表…… (185)

Part Ⅰ Mechanics

Section 1 Why is the Front Fork of Your Bike Bent[n1]? (Ⅰ)

0 A properly bent fork keeps the front wheel in its normal, forward going,[①] position. If it were straight, the front wheel would tend to turn sideways. Without the help of the hand, any slight deviation from its straight forward direction would lead to its further sideway sway[n2].

1 Many people use the bicycle every day, and are naturally familiar with the fact that the front fork of the bike is bent (see Figure 1). But perhaps few of them have ever wondered why its

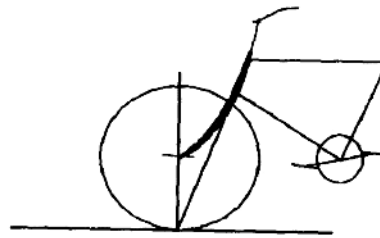

Figure 1 A properly bent front fork of a bike with its axis passing through the lowest point of the wheel, where the wheel touches the ground.

① (, forward going,) 前后各一逗号, 表示插入注释, "正常"即"向前进"的方向.

front fork is not made straight, which is obviously easier to manufacture. Is it made curved purely for its beauty, or is that a necessity for the normal working of the machine?

2 Strictly speaking, the fork is not necessarily bent, but may have other structural forms, for example, the motorcycles usually have two straight rods as the prongs of the front fork while its shaft is parallel to the prongs. However, one thing is certain for any front fork: it turns about an axis which passes through the lowest point of the front wheel, where the wheel touches the ground.

3 In fact, the curvature of the fork is not arbitrary, but strictly satisfies the condition mentioned above. The purpose of such a design is that when the handlebars turn a little, the frame of the bike will not sway left or right, nor will it go up or down, so that the rider will feel the handlebars free to rotate and hence easy to handle in its normal, forward-going, position. Moreover, when the rider is to go left or right, he turns the handlebars for a considerable angle, perhaps twenty or thirty degrees, raising the wheel slightly, which raises the center of gravity of the whole system(both the rider and the bike). This makes the rider feel that the front wheel as well as the handlebar has a tendency to return to the regular forward-going position. That is to say, the handlebars in the forward-going position feels as if in stable equilibrium, just as a ball in a bowl or basin[n5] can restore by itself(see Figure 2), once deviated from its central position. Such a bike is easy to manipulate. And that is why a skillful rid-

er can ride even without holding the handlebar.

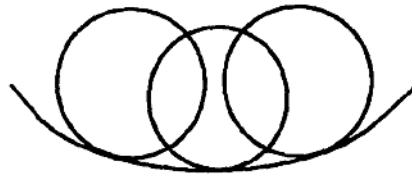

Figure 2 A ball in a bowl. The ball in the lowest position is in balance. And that is a state of stable equilibrium

4 In contrast to this situation is a ball on a ridge or hump—— it may be in equilibrium, but that is an unstable or labile equilibrium, where a small deviation from its initial position would lead to its further moving away, so that only a hand by its side ready to support can actually keep its balance(see Figure 3). In the case of the bicycle that would be a constant tendency of truning left or right of the front wheel, which requires that the rider

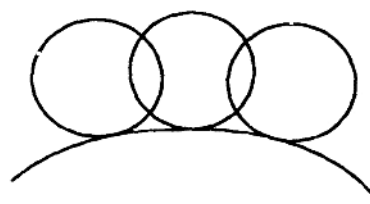

Figure 3 A ball on a ridge is in balance, but this is an unstable equilibrium. From the point of view of potential energy, the ball on the ridge has a higher potential energy than when it is in all other positions.

keep a hand on the handlebars to ensure the wheel in its forward going position. He cannot ride without a hand on the handlebars.

5 There are different methods to explain this fact, but the following is probably the easiest to understand.

〔题解〕

力和运动是人人熟悉的现象，有关的问题是物理学研究的起点。自行车是人们熟悉的交通工具，但自行车的力学问题却不像看起来那样容易解答。我们相信从熟悉的现象出发学习外语和科学是一种有效的学习方法，因此《新编英语科普文选》的第一册第一部分从自行车开始。

〔词汇〕

0 front fork *allit* 前叉子(自行车三轮车等)
forward-going pos**i**tion 向前进的位置(附录四 B)
sideway(s) *adj*, *adv* 向两边/两侧(的)
devi**a**tion *n*; **de**viate *v* 偏差；发生偏差
s**way** *vI*, *T*; *nU* 摆动，摇动；歪，偏向一边
1 manu**fac**ture *n*, *v* 制造
2 prong *n* 股，岔(叉子的)
shaft *n* 轴，特别是传递运动和力的
axis *n*, *pl*. **ǔx**ěs[L.] 轴，轴线，与车轴 axle 有别
3 **cur**vature *n* 弯曲度，曲率
handlebar(s) *n* often *nP* 车把

rotate *vI, vT* 旋转

stable equi**lib**rium 稳定平衡

equi**lib**rium *pl*. -bria[L] 平衡

bowl *n* 碗

basin *n* 盆

4 ridge *n* 高岗子,山脊

hump *n* 驼峰、凸包、公路上的拦路限速隆起

labile(esp. BrE - bil) *adj* 不稳定的

〔注释〕

n1[0] 过去分词 bent 属于被动式还是形容词,要看上下文。此处宜理解为形容词表示性质。

n2[0] |*Rhet*.| Alliteration 押头韵,指相连或并列的词或同一词内相连两音节开头的辅音相同。

〔复习问题〕

1 What does"properly bent" front fork of a bicycle mean?

2 Is there any straight prong structure that can **sub**stitute for (that behaves like)a bent fork?

3 What is the ad**van**tage of properly bending the front fork?

4 Use the example of a small ball in a bowl to explain the phe**nom**ena of a stable equilibrium.

5 Use the example of a small ball on a ridge or hump to explain the phenomena of an unstable equibirium.

6 What is the relationship between the potential energy of a

ball in its equilibrium position and its potential energy when it is in the neighborhood of the equilibrium position?

〔译文〕

第一部分　力学

自行车的前叉为什么是弯的？（Ⅰ）
——熟悉的东西不一定好解释

0　适当弯曲的前叉能使前轮保持在正常的前进位置上。如果做成直的，前轮就有向两侧偏转的倾向：手如不扶，一偏就会继续偏转（直至摔倒）。

1　许多人每天骑车，自然熟知自行车前叉是弯的（图1）。但恐怕很少有人怀疑过车的前叉又何以不做成直的，那样显然比较容易制造。做成弯的是单纯为了美，还是出于机器正常工作的需要？

2　严格说来，前叉子不一定是弯的，它也可以采取其它的结构形式，例如摩托车通常有两条直杆作为前叉子的两个岔，而前叉的轴则与两个岔平行。不过，有一点对所有前叉都是不变的：它的轴的轴线通过前轮的最低点，即轮与地面接触的那一点。

3　事实上，叉子的弯曲度并不是任意的，而必须满足一个严格的条件，即前叉的轴线如果延长的话必须通过前轮的最低点，也就是轮子和地面接触之点。这种设计的目的在于：当车把稍稍旋转一点时，自行车的架子既不左右摆动，也不上下颠簸，因而骑车人感到自行车前进时车把旋转自如，容易掌握。另外，当骑车人拐弯时，要把车把转动一个相当大的角度，可能是二三十度，这时前轮要稍稍升起，使得连人带车的整个系统重心上移[和一直向前时相比]。这时骑车人感到车轮车把自

动回复到正常的前进位置的趋势。(也许他感觉不到,但此力确实存在)。这就是说,车把在前进位置像是处于一种稳定平稳的状态,就像一个球放在碗里或盆里(图 2),一旦偏离中心,会自己回去。这样的车好骑。一个熟练的骑车人撒把也能骑车,就是这个道理。

4　和这种情况相反的是一个小球放在一个高岗或凸起(驼峰)上。它是可以平衡的,但那是一种不稳定的平衡。一旦稍稍偏离初始位置,它就会继续偏移,以致必须用手在一旁保护着小球才能真正维持小球的平衡(图 3)。在骑车的情况,如果叉子是直的,前轮不是左偏就是右转,骑车人只有不断用手扶才能维持车轮的前进位置,一刻也不能撒把。

5　要解释这一事实有不同的方法,但下面的方法大概是最容易理解的。

Section 2 Why is the Front Fork of Your Bike Bent? (Ⅱ)

1 To make the reasoning easy to understand, let us first suppose that the frame of the bike is fixed, so that the frame will not move when the assembly of the front wheel, fork and handlebars turns. The if the fork is bent, the tire[n1] (the periphery of the wheel) will form a surface like an apple or pumpkin placed on an inclined plane when you turn the handlebars. See the sketch of Figure 1.

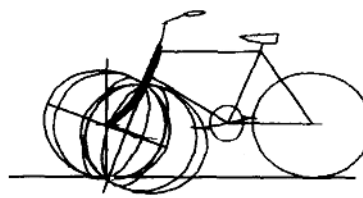

Figure 1 When you turn the handlebars by 180°, a surface like half an apple is formed. Part of the wheel will go under the ground if the frame of the bike is rigidly fixed. The ellipses show the shape of the tire when the handlebars are 30°, 60°, 120°, and 150° from the normal, forward going, position. The shape of the tire 90° from the normal position is a straight line. (caption)

2 With the handlebars turning in the close neighborhood of

the normal position, the lowest point of the front wheel will not move up or down, right or left, as can be seen from the sketch, Figure 1. But when the wheel is turned a larger angle, say twenty or thirty degrees or more to the left, the lowest point of the wheel will go down and go left. But for a point of the wheel to go down means that the point will go into the ground, which is impossible. Actually the frame and the rider on it must go up a little, when the front wheel turns a considerable angle. This can been seen more clearly from the figure if you imagine the wheel could turn 90° or even 180° You must raise the frame and yourself a little each time you turn left or right(see Figure 2).

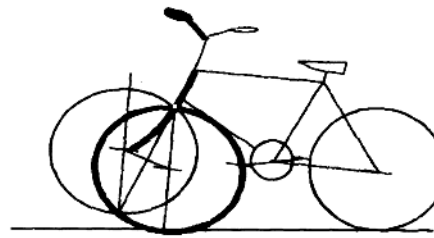

Figure 2 In the extreme case of turning the handlebars 180°, you must raise yourself and the bike a little.

3 But to raise the bike you must do work, which means your arms must exert some force to turn the handlebars. And the larger the angle of deviation, the greater the force needed, until the angle reaches 90°, when the bike cannot advance at all, and so we have no need to consider further turning. This shows that

the wheel does not tend to move sideways when you do not exert any force to turn the handle. On the contrary, it tends to stay in its "normal position".

4 Now suppose that the front fork were made straight. You can make such a bike that is always in neutral equilibrium, as shown in Figure 3a, by making the shaft of the fork vertical. In that case the axis passes the point where the wheel touches the ground, satisfying the basic requirement mentioned above. In such a design, wherever you turn the wheel, the whole system including the rider will not go up or down, as can be seen in Figure 4. But the handlebars of this design will be too far away from the seat so that the rider must bend forward to reach it, as shown in Figure 3a, which is undesirable.

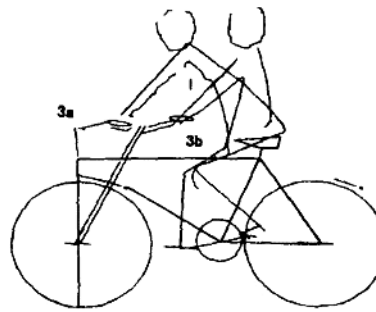

Figure 3

3a. Straight fork with the axis vertical

3b. Straight fork with the axis slanting

Figure 4 A straight fork with a vertical axis is in neutral equilibrium but the handlebars are too far from the seat.

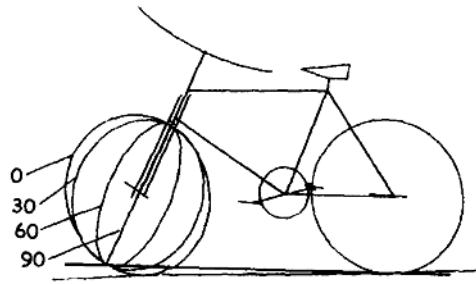

Figure 5 A straight front fork with a slanting axis is unstable. It tends to turn a 90°-angle and make the potential energy of the whole system a minimum.

5 So we must have the handlebars closer to the seat, and the axis of the fork inclined(see Figure 3b and Figure 5). But then when the handlebars turn, the lowest point of the wheel will go up with respect to the frame, as shown in Figure 5. The reader can draw inference by himself and prove that the handlebars are

unstable.

6 A further problem is left to the reader: the equilibrium of castors under a piece of **fur**niture to make it easy to move.

〔词汇〕

1	**ass**embly *n*	组装件
	tire(AmE) = **ty**re(BrE)	轮胎(胎:音译;口语:带),详见 n1
	peripher-y *n*;-*al* *adj* [Gk] cf. circumference [L]	外围
	pumpkin *n* (also read/pung-kin/)	南瓜
	caption *n*	图的说明,解说词
4	**neu**tral equi**li**brium	随遇平衡,中性平衡
	undesi**r**able *adj*	不希望的,不受欢迎的
	s**lan**t *vI*, *vT*	倾斜/使倾斜
5	with res**pec**t to *prep*	相对于
	draw **in**ference *vI*	(进行)推理,推论
6	**cas**ter = **cas**tor *n*	脚轮
	furniture *nU*	家具

〔注释〕

n1〖*Lex.*〗 美国英语和英国英语拼写不同,本书用美语(AmE)而在注中给出注明英国英语,如 BrE: tyre。