Readings in Mining English

矿业英语注释读物

矿井运输设备

中国矿业学院外语教研室
淮北煤炭师范学院英语教研室 编注

煤炭工业出版社

矿业英语注释读物

矿井运输设备

中国矿业学院外语教研室
淮北煤炭师范学院英语教研室 编注

煤炭工业出版社

内 容 提 要

本书内容选自英国出版的书籍，适于有一定英语基础而想尽快掌握阅读专业文献技能的人员阅读。专业内容涉及了主要的矿井运输设备。注释部分举有大量例句，对理解语法很有帮助。参考译文力求准确、通顺。词汇表中有大量的专业词汇。

本书可供有关工程技术人员及大专院校师生学习专业英语之用。

责任编辑：殷永龄　顾建中

矿业英语注释读物
矿井运输设备

中国矿业学院外语教研室
淮北煤炭师范学院英语教研室　编注

煤炭工业出版社　出版
（北京安定门外和平北路16号）
煤炭工业出版社印刷厂　印刷
新华书店北京发行所　发行

开本787×1092 1/32　印张6 3/8
字数 139 千字　印数1—5,600
1985年5月第1版　1985年5月第1次印刷
书号15035·2688　定价1.40元

前　言

本书原文选自英国国家煤炭局技术培训部1977年编的教材 Armoured flexible conveyors等书，目的是帮助读者提高英语水平。对其内容在技术上是否先进和是否符合我国实际情况没有严格要求，请读者阅读时注意。

本书由中国矿业学院基础部外语教研室齐殿林教授和淮北煤炭师范学院外语系英语教研室张式平副教授共同编注。

Contents

Ⅰ. THE RAILWAY TRANSPORT

TRACKWORK

AMERICAN EXPERIENCE.—With the rapidly increasing use of locomotive haulage in British mines, knowledge and experience of maintenance of track for the successful operation of such methods of haulage is of importance[1]; and as the Coal Division of the American Mining Congress published, a Summary of Reports on the Construction and Maintenance of Main Haulage Roads in Coal Mines, their main findings are of interest. These are: —

BALLAST.—The function of ballast is to transfer the applied load over a large supporting surface, hold the sleepers in place in a horizontal plane but allow them to be readily adjusted in a vertical plane to maintain correct gradient and provide an elastic road bed[2]. The minimum thickness of ballast to be provided[3] varies with[4] the conditions but should be between 3 and 6 in. It is important that the sleepers should have a firm support and ballast should be tamped under them and particularly under the ends and under the rails; while it should be loose under the middle of the track.

RAILS.—The weight of rail used veries from 50 to 100 lb. per yd. on main roads, with 60 lb. as the section most commonly in use[5]. For rooms where track-mounted equipment is used, rails of 30 to 35 lb. per yd. are usually adopted with 25 lb. as the minimum.

In Britain, the 40-lb. rail is the section generally adopted for main roads, and for secondary roads 20 to 25 lb.In view of[6] the tendency to replace auxiliary and secondary haulages by gate and trunk conveyors and to adopt locomotive haulage on main roads wherever the gradient permits, the use of a rail of 45 to 60 lb. per yd. section is likely[7], but it must be stressed that good track construction is more important than the use of heavy-section rails, although these[8] give stiffness to the track, reduce resistance by reducing rail creep and give increased adhesion to locomotives by reason of the greater width of the head of the rail. In the U. S. A.[9] and in Holland, thermit-welded rail joints have given very satisfactory service. They eliminate fish-plates and bolts, reduce joint maintenance and vibration, and where trolley locomotives are used with rails as the earth return, the resistance and sparking is reduced.

SLEEPERS.—The rails are spiked to sleepers; the inner spikes should be opposite each other and the outer spikes[10] ahead in the direction of the traffic or the loaded trains where single-track working is adopted.

If the road is not to be used permanently, untreated wooden sleepers would probably be used. These[11] have a life of two to five years, but if the road is to be used for a longer period, pressure-treated sleepers impregnated with creosote or zinc chloride, 1/2 lb. to the cu.ft., will be found to be more economical. They have a life of from 7 to 17 years depending on the wood used and the conditions of service. The sleepers should be 30 in. longer than the gauge of the track, from 6 in. × 4 in. to 8 in. × 6 in. in cross-section according to the weight of rail in use, and spaced at intervals of 16 in. to 24 in., with a minimum spacing of 10 in. in order to allow of[12] proper tamping of ballast beneath the sleepers.

GAUGE.—In a praiseworthy attempt at standardisation the gauge for collieries in the U.S.A. has been fixed at 42 in. It is realised that[13] in certain conditions, notably in thin seams, a narrower gauge is necessary, and 36 in. or 30 in. is recommended. Where a wider gauge is required 48 in. or the British Standard surface railway gauge of 4 ft. $8^1/_2$ in. is advised.

It is generally considered that 42 in. is rather wide for British conditions although the benefits of increased stability have not been lost sight of[14]. Standardisation in this country is more likely to be at a gauge of 30 in. or 36 in.

TURNS AND CROSSINGS.—In the U.S.A. standard-

isation of track accessories has been made definite and is incorporated in a series of specifications and drawings for riveted frogs, cast frogs, switches, guard rails and turnouts. Main-road switches are often welded to cross rails to improve stiffness and alignment, the cross rails being disposed directly ahead of the switch points, half-way along the switch points, at the heel of the switch and three between the heel and the frog[15]. Electric contacts are often provided to indicate when a switch has not been properly closed, a red light then warning an approaching locomotive.

The Dutch[16] State Mines adopt a similar standardisation of turns and crossings and find that this practice reduces derailments and cheapens the cost of manufacture and installation.

BRITISH PRACTICE.—Below are the instructions[17] to men and officials responsible for the maintenance of the track on a locomotive haulage installation for man-riding in Great Britain.

LAYING OF TRACK.—The foundation should be cut sufficiently low to allow for a 4 in. thickness of ballast underneath the sleepers. Ballast should be spread before the sleepers are laid and should be not larger than 2 in. nor finer than 3/4 in.

Sleepers must not be more than 1 yd. apart, centre to centre. The rail ends may have a sleeper directly

underneath them or, alternatively, a sleeper at each end of the fish-plates. These joint sleepers are additional to the ordinary sleepers.

Sleepers to be packed for a distance of 9 in. on each side of the rail, this packing to be done with chippings sized about 3/8 in[18]. Rails to be laid on the sleepers with the dogs driven in so that they just touch the bottom flange of the rail. The dogs should be staggered on the sleepers and not placed opposite one another in the centre of the sleeper. This leaves alternative positions for dogs when sleepers are moved.

Fish-plates are to be put on tightly and with the bolts inserted all in the same direction, i. e., with the heads either all inside or all outside.

Rails to be set accurately across and to line and level. In the case of curves rails must be set to the proper cant.

Before the dogs are driven hard down, traffic must be run over the track for, say[19], 24 hours, after which the line must be gone over, packed where necessary[20], and have any defects rectified[21].

MINE TUBS AND CARS

Some[22] 80 per cent. of the containers used to transport coal from the face to the surface in British mines

had, until recently, a capacity of less than 15cwt., the bulk of these carrying between 10 and 15 cwt[23]. The size of tub adopted has in the past depended on the natural conditions, particularly the thickness and inclination of the seams and the method of working employed. The choice between hand and machine mining generally determines whether or not the tub is taken on to the face[24], but initially this[25] was influenced by seam thickness. In addition, the custom in the locality with regard to[26] the size of tub has played a prominent part. With the advent of increased mechanization, particularly where trunk conveying is adopted and the tub need not leave the main roads[27], the size of tub has greatly increased to between 2 and 6 tons.

MINE TUBS.—The majority of tub bodies are now constructed of plates of mild steel or aluminium alloys of comparative strength.

The plates are painted with anti-corrosion compound and may be riveted with the joints at the corners to facilitate renewal if damaged and torn in an accident[28]. Lapped joints are also used and rivets dispensed with[29], which further simplifies replacement of damaged sides and ends.

Welded-steel tubs are increasing in popularity both in this country and abroad as they save labour in construction and are lighter.

MINE CARS.—As it is now generally agreed that the majority of tubs are too small and that a change, in any event, is necessary, since the rapid growth of face and gate conveying has removed the necessity of taking the tub on the face and manipulating it by hand, it is therefore advisable to install the largest size of mine car that conditions will allow[30]. The inherent advantages of mine cars over[31] tubs are that the capacity of the whole transport system is increased and becomes more economic, since the pay load or useful load is increased relatively to the gross load, the power required is reduced since the friction is lessened, and the number of cars in circulation and in consequence the men required to manipulate them is also reduced[32].

One of the main advantages of mine cars is the increase of haulage speed they permit with safety[33]. Tubs are generally limited in safe speed by non-rigid bearings and short wheel bases, but it becomes an economic proposition to equip mine cars with low-friction roller bearings and to stiffen up construction so that maintenance is reduced and car life increased.

AUTOMATIC COUPLINGS. — In order to economize in manpower engaged on transport operations, automatic coupling of mine cars is often adopted, though these[34] are rarely fitted to mine tubs since the cost of converting a large number of small capacity tubs would be prohibi-

tive. Their use reduces the chances of accidents due to haulage operations, many of which occur when coupling or uncoupling tubs. In the design of automatic couplings, the buffering and draught gear and the coupling are incorporated in one piece of equipment and most designs can also be arranged to rotate for use with tippers feeding the bunkers of skip-winding equipment.

Sufficient latitude must be provided in the couplings to cater for changes in gradient and allow coupling to take place when the ends of the cars are at a difference of level of a few inches, such as occurs when an empty and a full car are to be coupled, and to negotiate curves and allow of coupling when the cars are not in line[35].

THE A.S.F. COUPLING.—This automatic coupling has a $1^1/_2$ per cent. manganese steel body provided with a hinged swinging lock inside, the locks of the two halves of the coupling sliding past each other when coupling. The draught-gear is provided with an inner helical centring[36] spring inside the main buffering spring. The coupling can be uncoupled from the side or from the top.

WHEELS, AXLES AND BEARINGS. —Cast-steel wheels are lighter and more durable than cast-iron wheels. On small tubs in this country, the wheels are generally fixed to the axle which revolves in pedestals of which there are a wide variety of[37] designs. In some types, in order to reduce the coefficient of friction between the axle and

the pedestal, a renewable bronze bush is used.

LOOSE WHEELS. --Wheels fixed to the axle have a relatively high frictional resistance to traction of 40 to 60 lb. per ton and, in order to reduce this[38] and to economize in the use of lubricant, wheels which revolve independently on a fixed axle may be used. These can negotiate curves freely without one wheel skidding, as occurs with wheels fixed to the axle[39].

ROPE HAULAGE

ROPE CAPELS. —Except on endless-rope haulage systems, some type of capel is required to connect the rope through links to the clivvy or D-link with cotter to which the set of tubs is attached.

BENT-BACK WIRE CAPEL.—The stages in preparing this type of capel are shown in Fig. 1 A, to E. The rope is first wound with a tight layer of seizing wire of soft iron 12 or 14S.W.G.[40] beginning at a distance from the end equal to the length of the socket less[41] $1/_2$ in., the length of the seizing being 1 in. longer than the length of the socket, A.

A cone is then built up on the seizing nearest the end of the rope consisting of layers of decreasing length of seizing wire and the end of the rope is next[42] opened out and the wires straightened. One-third are cut to

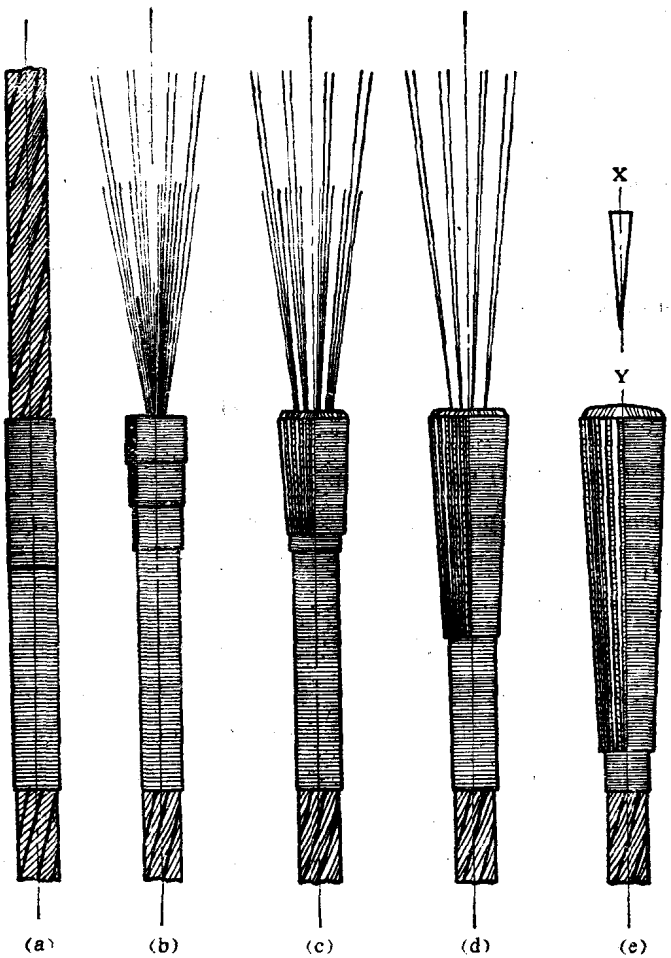

Fig.1Bent-back wire capel

a length equal to two-thirds the length of the socket and another third to a length of one-third the length of the

socket, B[43]. The shortest wires are now bent back and secured by a layer of seizing wire, C. The medium-length wires are then bent back and seized, D and, finally, the longest wires are treated in a similar manner. The cone thus formed is drawn into the socket and a tapered pin of wrought iron, X, is then driven down the cone at Y. The length of this pin is 3 to 4 times the diameter of the rope and the wide end is rather[44] larger than the fibre core of the rope.

ROLLERS AND PULLEYS. —Rollers in the centre of the track are necessary to prevent excessive external abrasive wear on ropes, but it is very necessary that they be kept[45] free running and well lubricated as the passage of a rope over fast[46] rollers may cause the formation of martensite on the rope. The ordinary type of cylindrical roller of cast steel or cast iron varies in diameter from 4 in. to 6 in. Much power is absorbed on rope haulages in overcoming the inertia of rollers and pulleys and keeping them turning, and there is a field for[47] their replacement by those[48] fitted with ball and roller bearings. Curves should be as large diameter as possible and the pulleys used to guide the rope round them should either be of large diameter or consist of an arc of small pulleys, though the former is preferred owing to the reduced bending angles at the pulleys. They should be supported only by steel, as if[49] the pulley becomes fast, heat is quickly

generated and may set oil and wooden supports on fire.

MAIN OR DIRECT ROPE HAULAGE. —There are two sets of conditions to which this system of haulage is generally applied, in both cases the inclination required is relatively steep:—(a)Hauling coal up an inclination which is steep enough for the empty tubs to run back down the incline and drag the rope after them;(b)lowering coal down an incline by gravity and hauling empty tubs up an incline which is not steep enough for self-acting incline, but steep enough for the full tubs to drag the rope after them. The gradients required will depend upon the tractive resistance of the tubs or cars, for small tubs with plain bearings the limiting gradient is generally taken as[50] about 1 in 12[51] when the length of haul is short, in the region of 500 to 800 yd. Where mine cars with ball or roller bearings are used the limiting gradient is much less, 1 in 20 to 25, and the haul can be much longer.

TERMINAL ARRANGEMENTS. —At the despatching and receiving terminals of a main-rope system, arrangements must be made to marshal and to land the trains. At the despatch end the full tubs are marshalled on a level-pass-bye and the empties[52] are received on a parallel track provided with just or stop blocks to prevent the empties running through the pass-bye when the rope is detached from them. The two tracks are generally on