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Shaft Sinking and Drifting

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в качестве пособия
по переводу с английского языка на русский
для учащихся горных техникумов

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АННОТАЦИЯ

В данном выпуске приводятся неадаптированные английские тексты по проходке вертикальных и наклонных стволов шахт.

Цель книги — подготовить учащихся к самостоятельному чтению и переводу подлинников горно-технической литературы по данной специальности. Для овладения необходимой терминологией к пособию прилагается терминологический словарь с фонетической транскрипцией английского произношения.

Книга утверждена Управлением учебных заведений Министерства угольной промышленности СССР в качестве пособия для горных техникумов.

Shaft Sinking and Drifting
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1. ТЕКСТЫ ДЛЯ ЧТЕНИЯ И ПЕРЕВОДА

1. SHAFT SINKING

1) Preliminary Considerations

When coal has been proved to exist in sufficient quantities to be an economic proposition, it is then necessary to fix the site, shape and size of the shaft required to work the area. This requires careful consideration, and many factors have to be taken into account.

Site of shaft, *(a) Underground considerations.* The inclination is very important. In a flat seam it may be desirable to have the shafts in the centre of the area in order to keep the roads of equal length to the boundary.

In an inclined seam it may be better to sink somewhat to the dip side, there by utilizing the force of gravity to run the major part of the coal and water to the pit bottom and having short dip haulage and less pumping.

Faults should be avoided on account of the weak strata in these areas.

If possible, sinking should keep clear of running sands, heavily watered strata, etc.

(b) Surface considerations. The shafts must be reasonably near to efficient transport facilities (rail, road, canal or sea). The nature of the ground should also be carefully considered, as soft ground means costly foundations for buildings and machinery, whilst hilly ground means expensive cuttings for buildings and sidings. A good supply of water conveniently near is desirable for coal cleaning, steam raising and baths.

Shape of shafts. Shafts may be circular, rectangular or elliptical in shape. In England the circular shaft is popular. It is the easiest and cheapest to sink and is suitable for greater depth and water pressures. It also gives more space for ventilation during winding.

Rectangular shafts are suitable for shallow depths and timber linings and for this reason they were popular in Scotland until recent years, but in the new sinkings to deeper coals they have been replaced by circular shafts. They are still extensively used in the U. S. A.

Elliptical shafts have never found favour in England although there are some on the Continent.

Size of shafts. This depends on the output and ventilation that will be required when the colliery is fully developed. Space has to be allowed for water pipes, compressed-air mains and electric cables. The new deep shafts are 22 and 24 ft. diameter.

Laying off the shaft centres. When the site, shape and size of the shafts have been decided upon, the next step is to set off their centres. This is best done by permanent plugs, as the many surface buildings, engines, etc. will require to be set off from these centre lines.

2) Sinking

Sinking to the Rockhead. In commencing the excavation, the surface- and sub-soils are worked out by hand and barrow or by grab crane forseveral feet in depth, making the excavation wider than the finished diameter of the shaft to allow for the lining. For a 20 ft. 6 in. finished diameter that of the excavation should be 27 ft., allowing for 2 ft. 3 in. of brick or concretework.

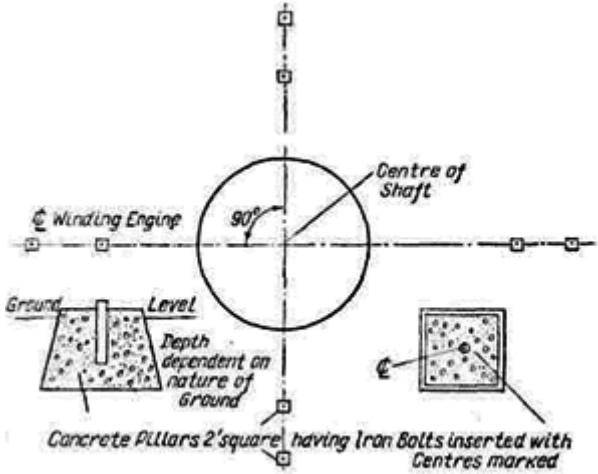

Fig. 1

When it becomes necessary to support the sides of the excavation, a heavy wooden frame (Fig. 1) is built across the shaft top from which the temporary lining is suspended.

3) Temporary Lining

Mild steel skeleton rings are used for securing wooden backing deals to support the sides of the excavation. The rings are made -in segments not more than 10 ft. in length, shaped to the circumference of the shaft, say 27 ft. The

segments are of 41/2 in. by 11/4 A in. section and have at each end four 1 in. by 1 in. square holes spaced at 4-in. intervals. They are connected together by curved fish-plates, having eight holes spaced to suit the holes in the segments and 31/2 in. by 1 in. diameter bolts. Thus there is room for a certain amount of adjustment for varying diameters in the -excavation.

The backing deals are of larch 5 ft. long, 9 in. wide and 11/2 in. thick, and are securely held against the sides of the excavation by wedges driven between the rings and the deals. Each ring is suspended from the ring above by hangers of 1 in. diameter placed at intervals of about 10 ft. around the shaft curcumference, the top ring being suspended from the shaft-top timbers. The rings are hung either normally at intervals of 4 ft. or according to requirements.

4) Permanent Lining

This may be of brick, concrete or special steel tubbing. When the rockhead is reached, the ground around the shaft is trimmed off and made fairly level from 3 ft. to 4 ft. wide according to the thickness of lining to be installed.

A 6-in. layer of concrete is then laid down to form a perfectly level bed, the inside edge of the concrete being the finished diameter of the shaft. A bricking curb or crib is then set on wood blocks about 1 in. thick, on top of the hardened cement (Fig. 2). This curb may be of oak, cast iron iron or concrete and is made in segments suitable for handling and conforming to the diameter of the finished shaft. It is good practice to lay the complete curb out on a test bed on the surface in order to see that the segments fit properly, then to number each segment and take each down the shaft in numbered rotation. They are

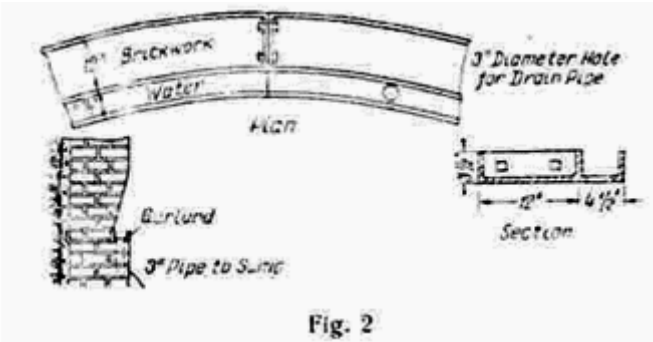

Fig. 2

carefully set on the prepared seat, correctly centred and bolted together, each joint being wedged against the sides of the excavation to hold it in correct position.

The front is sealed off with clay and cement is. run in behind and below the curb to give it a good seat. The brickwork is started from it when the cement has had time to set and iskept to the true finished circumference of the shaft by wires hung from the surface timbers. The lining is usually built with alternate courses of headers and stretchers, and as the -work proceeds the temporary lining is removed and the space between the brickwork and the sides of the excavation is filled with concrete to prevent infiltration of surface water. After the first 4 ft. 6 in. of brickwork has been completed a scaffold will be necessary.

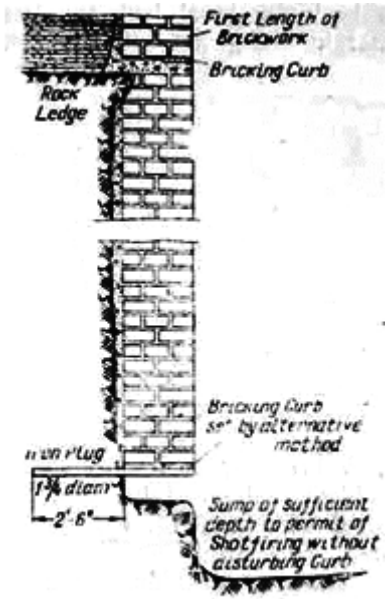

Fig. 3

The brickwork is continued until the base of the surface foundation is reached. This might be about 35 ft. square and 20 ft. deep, according to the nature of the ground and the extent of the permanent headgear.

In some cases the shaft diameter is widened at the curb and gradually brought back to the normal diameter by means of the brickwork, this allows of a special combined bricking curb and water garland being put in to catch any water running down the shaft lining. It is made in segments bolted together with V2-in. wood between, to make a watertight joint (Fig. 3).

When starting the sinking below the curb, care must be taken to avoid disturbing the curb, and no shotfiring should be done at this stage. A rock ledge is left to support the curb and a further 60-100 ft. is sunk, using a temporary lining suspended from the curb above or from iron plugs let into the rock. The lower section of brickwork is carried out as before and coupled

up to the first bricking curb. When joining up, the rock ledge is carefully excavated, one section at a time, and replaced by brickwork so that the curb is never unsupported.

5) Lining Shafts with Concrete

There are three methods of lining circular shafts with concrete, namely, (a) the us solid concrete blocks, (b) a brick wall filled in with concrete behind, and (c) the use of liquid concrete. The first method, that is, the use of concrete blocks, is favoured on the Continent. The blocks are moulded or shaped to the curvature of the shaft and laid in good quality cement. Usually the blocks are intended or grooved so that the layer of cement receives a good gripping surface. Since the blocks are heavy, some convenient method of lowering and handling is desirable. A frequent method is to leave vertical and horizontal holes, which cross each other in the blocks. A long bolt is passed through the vertical hole and held in position by a cotter pin passed through the horizontal. After the blocks have been lowered and placed in their correct position, the bolt and cotter are removed and the holes filled with cement.

The second method, that is, brick-walling and concrete filling, may be viewed as a modification and is in some favour in many new sinkings. Since a concrete lining requires some time to "set" firmly before the forms or shuttering can be removed, some engineers build the form for the concrete in brick, fill in the concrete behind, thus obtaining a brick-faced concrete lining. In this case, care is taken not to tamp the concrete in too violently behind the "green" brickwork. It is claimed that a lining of this nature is not only a good sound job, but that considerable time is saved as compared with a lining composed wholly of concrete.

6) Use of Liquid Concrete

When sinking through water-bearing strata where the cementation process has been employed, usually a small quantity of residual water remains to be dealt with. It is desirable in such cases to seal off the water and for this purpose a concrete wall is a successful lining. A shaft lining composed of concrete is much more capable of resisting compressive than tensile forces,

the ratio being about 10 to 1. Further, when sinking through porous water bearing strata, the concrete wall is naturally subjected to hydraulic pressure and therefore the lining employed must be strong enough to withstand the pressure upon it. In this case, the concrete is sometimes reinforced in order to give the necessary additional strength. The type of reinforcement usually employed consists of steel rods of suitable section bent to the curvature of the shaft and incorporated in the mass concrete. The design and dimensions of the steel reinforcement are matters of calculation, knowledge and experience. When reinforced concrete is to be employed, the mining engineer usually gets designs from engineers who have specialized in such work.

7) Concrete Mixtures

The following notes deal with the quality, proportion and mixing of the concrete ingredients.

Cement. This should be carefully tested and, in addition, comply with the British Standard Specification as to fineness, specific gravity and tensile strength. In concrete walling, a quick-hardening cement is preferred _ so that the sealing off of water leakages by injection behind the walling can be performed expeditiously.

Sand. This also requires careful selection. When examined under the microscope, the grains should appear sharp and angular. The admixture of clay or loam is very detrimental to the making of good concrete. Washing, of course, may be employed to remove these impurities, but it is preferable and cheaper to obtain a quality of sand of the required purity in the first instance.

Aggregate. A compact rock, such as crushed granite, is usually the best. Two sizes are sometimes used, namely, $^1/_2$-in. chippings and $1^1/_2$ to 2-in. screened stone. The aggregate forms the bulk of the finished concrete. The cement and sand merely form a matrix which binds the aggregate together. The greater the strength of the individual fragments of rock or aggregate, the greater is the strength of the concrete as a whole. In principle, the interstices or voids in the large fragments should just be filled by the chippings and the voids still remaining should be completely filled by the matrix of sand and cement.

The mixtures used in shaft concreting work vary within certain limits, but usuallv range from $1^1/_2$ -2-5, 1-2-5, 1-3-5 and 1-3-6 (that is, cement—sand—broken rock or aggregate). A common mixture is in the proportion of 1 of cement, 2 of sharp clean sand and 5 of brok rock. The normal concrete mixture used in lining a recent South Ayrshire sinking was 1 of cement, 2 of sand and 4 parts of whin chips. The size of whin chips (or aggregate) was 3/4 inch to $1^1/_2$ inches. The proportions were altered generally to 1-1-3 and occasionally to 1-1-2 for water-bearing strata.

The proportions selected are measured out accurately and mixed when dry, after which a measured quantity of water is added and the whole mass thoroughly mixed wet. The mixing is performed on the surface by a mechanical mixer. This means a saving in labour and absolute uniformity in the quality of the concrete. In one case a concrete mixer was employed of 14 cubic feet dry and 10 cubic feet wet capacity. For small shallow shafts, where the wet Concrete is lowered in buckets, a $^1/_2$ cubic yard capacity mixer is usually sufficient. For larger and deeper shafts a corresponding increase in capacity is desirable. The concrete is lowered in various wavs, such as buckets, pipes or bottom discharge hoppers which deliver into a chute that deposits the material behind the forms or "shutterings". Probably the best method is a pipe, leading down the shaft, from the hopper at the surface mixer to the concrete shutterings. To the end of the pine is fixed a flexible spout bv means of which the flow of concrete can be directed to anv part of the shaft circumference. Care should be taken to avoid cavities or voids in the concrete mass. The mass is systematically worked down behind the shuttering by long-bladed shovels,

8) Thickness of Concrete Wall

This depends on several factors, such as (a) size and depth of shaft, (b) nature of ground, (c) presence of water and hydraulic pressure, and (d) whether the cementation process has preceded the concreting work. For the first 30 to 50 feet from the surface, the concrete wall may be 2 feet 6 in. thickness, which is gradually reduced to 14 in. when dry sinking. A common thickness is 12 or 14 in. which is increased to 18 in. at landings. A ventilation shaft, 15 feet in diameter, was sunk recently in West Wales. For the first $67^1/_2$

feet it was lined with 9 in. of brickwork with 18 in. of concrete behind. From this depth down to a total depth of 455 yards a concrete lining was put in of a thickness varying from 9 in. to 24 in. which was increased to 36 in. at insets. It should be noted that this shaft was sunk by the cementation process.

9) Shutterings

When the concrete wall is built upwards in a shaft, forms or shutterings are necessary to keep the plastic mass of concrete in position around the shaft sides, until it sets properly, after which they are removed. The shuttering usually employed is of a collapsible steel type. The steel plates are from $^{2}/_{8}$ to $^{1}/_{4}$ in. thick stiffened by angles and hinged at the corners to facilitate handling. A complete ring may be composed of from 4 to 6 segments 2 feet 6 in. or more in height securely bolted together. These shutterings are left in position until the concrete wall is thoroughly set, which normally takes 3 to 4 days, the shuttering used in a recent South Ayrshire sinking consisted of 8 segments to the circle, 2 feet 6 in. in height, the rings being heing 8 in.,12 in. or 22 in. in height according to requirements.

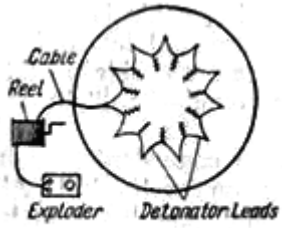

Fig. 4

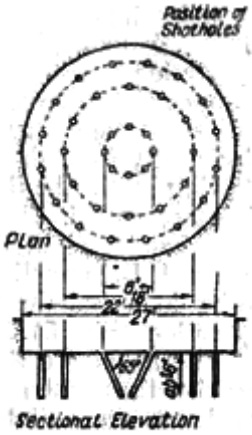

Fig. 5

10) Shotfiring in a Sinking Shaft

The holes are drilled by compressed-air hammer drills weighing 30—60 lb. and working at a pressure of 80 lb. per sq. in. The drills may be mounted on a special frame and connected by suitable hosing to the compressed-air main, which is usually about 4 in. in diameter. About nine such drills would be used in a shaft of 27 ft. outside diameter, and this would entail the use of a special nine-hole coupling to the compressed-air main (Fig. 4).

All holes are drilled about 6 ft. deep (depending upon the nature of the strata) and the explosive used is gelignite, which is resistant to water. About 1 lb. to 11/2 lb. is used per hole, the outer holes having a lighter charge to avoid

damaging the outer walls of the excavation.

Special low-tension detonators are used and the shots are coupled in series and fired electrically from the surface, one ring at a time, starting with the inner ring, or sumpers, as they are called. The shotfiring cable is wound on a hand reel at the surface and lowered as required. Delay-action detonators enable all this to be done and the whole round "fired" in one operation (Fig. 5).

The shots are fired by a competent person, usually the master sinker on each shift. All workmen are withdrawn and gear likely to be damaged is raised a sufficient distance up the shaft to ensure its safety.

11) Bricking Scaffold

This is constructed in three parts. The central portion is made of two main oak timbers, 12 in. square, having four cross runners leaving a space 8 ft. square for the passage of the kibble. The opening is covered over when bricking or cementation is being carried. The whole of this portion is covered over by stout 3-in. boards (Fig. 6).

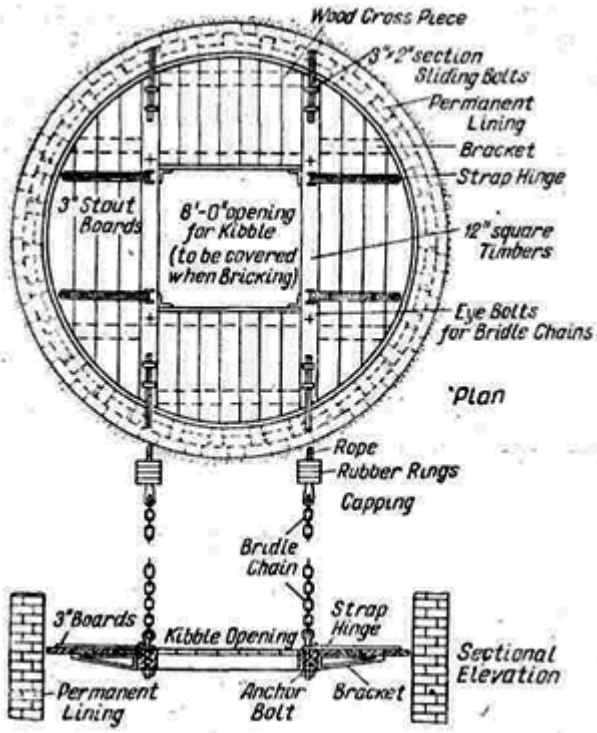

Fig. 6

The two side pieces are made of 3-in boards, well secured with steel brackets and attached to the main runners by strap hinges made ofgood wrought iron. The diameter of the scaffold is slightly

less than that of the shaft. It is
suspended by lock-coil ropes from the headgear pulley and each rope carries two .bridle chains secured by shackles to four bolts passing through the main timbers.

Sometimes extra bridle chains are attached to the side pieces as a further precaution.

Four sliding bolts are used to keep the platform steady when in use, the bolts being pushed on to the top of or into holes cut in the brickwork of the cemented side. About 4 ft. 6 in. of walling is done at one time, and the scaffold, which together with the bridle chains weighs about 5 tons, is raised slowly by means of a double drum winch on the surface, one rope going to each drum.

Several wire-rope ladders may be suspended from the scaffold to the shaft bottom to act as emergency exits for the sinkers.

The scaffold ropes serve as guides for the rider. A number of rubber rings supported by clamps are secured to each rope just above the capping to relieve the impact when the kibble descends rapidly.

12) Handling the Debris

The raising of the debris is done by a sinking kibble (also called hoppit, bowk, kettle or bucket, according to the district). To prevent undue swinging during its travel in the shaft, the kibble is guided by a rider, using the bricking scaffold ropes as guides.

This allows much greater speed and safety during winding. The rider consists of a horizontal arm suitably strutted to two vertical limbs on which are two pairs of guide shoes sliding on the scaffold ropes.

13) Keeping the Shaft Vertical and Circular

It is essential to keep the shaft truly vertical and a centre-line apparatus must be provided to enable plumbing to be accurately and speedily carried out.

The apparatus is used for setting off the side holes during sinking operations and also for setting the bricking curbs, and is used in conjunction with a radius rod equal in length to the outside radius of the shaft and graduated in feet and inches.

14) Ventilating the Sinking Shaft

As a great amount of shotfiring is necessary in a sinking shaft and very heavy fumes are given off from the explosive used it is essential to have a good fast-flowing air current blowing into the pit bottom to sweep the fumes and smoke speedly to the surface and to cut down to a minimum the time interval necessary before the sinkers can return to work.

This current of air is produced by a forcing type of fan situated on the surface and it is directed down the shaft in sheet-iron tubes of 18 in. to 24 in. in diameter.

The tubes are taken down to a position in the shaft clear of shotfiring and a canvas bag (pipe) used for the remainder of the distance. This can be raised by means of a wire to prevent damage when shotfiring.

The tubes are supported at intervals of about 30 ft. by collars clamped round them. Each collar is held by two wrought-iron strap hangers bolted to rag bolts grouted into the walling or into the side of the excavation.

15) Lighting the Shaft

Good lighting in the bottom of a sinking shaft is essential for efficient work, and this may be achieved by means of a light armoured cable suspended from a reel on the surface and carrying a cluster of lamps. When shotfiring is taking place the lamps can be wound up to a place of safety.

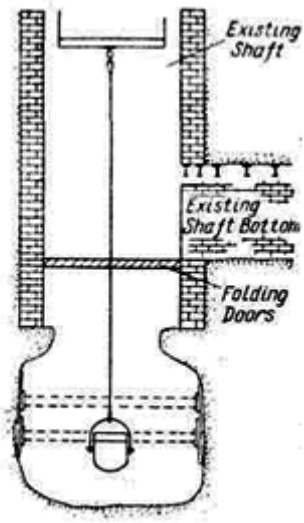

Fig. 7

To prevent accidents due to short-circuits it is advisable to keep the lighting cable on the opposite side of the shaft to the shotfiring cable.

16) Dewatering the Shaft

Most sinking shafts are wet in varying degrees and some means must be adopted to remove the water from the bottom. Three methods can be used and the choice depends entirely upon the amount of water to be removed- The general rule is to calculate the

shaft area and then use whichever methods will keep the water below two feet depth at the bottom.

The first method uses the ordinary kibble when small quantities have to be removed.

It is better to adopt the second method, which is to employ a self-filling water barrel (Fig. 7). This is put on in place of the kibble and suspended by chains from the winding rope shackle.When the feeder exceeds 100 gallons per minute it is policy to install a shaft pump. The most common type is the vertical turbine type,
which may deal with anything up to 2000 gallons per minute and up to about 1200 ft. head.

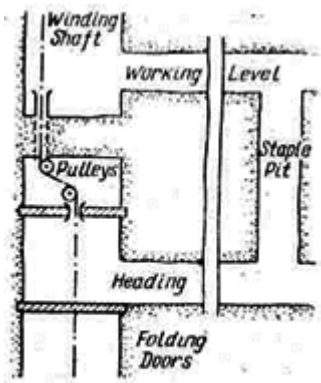

Fig. 8

The pump is suspended by a wire rope fixed at one end on the headgear, passing down the shaft, round a pulley on the pump, back up over a pulley on the headgear and so to the drum of a power winch by which the pump is raised and lowered. The rope used is galvanized and of fairly large diameter since it has a heavy load to sustain (Fig. 8).

To retain the suspension rope, electric cable and rising main correctly spaced and to add stability as a whole, clamps are fitted every 25 ft, or so. These clamps fit tightly against the pipes, but the ropes are free to run inside the clamp holes.

Normally a centrifugal pump of about six to eight stages is used.

17) Deepening an Exisitng Shaft

This may become necessary with a view to opening out some lower seam. The method adopted depends on the conditions prevailing.

a) Disused shafts. Deepening is carried out in the usual way when the necessary equipment has been installed at the surface. The existing lining and shaft fittings should be carefully examined and repaired where necessary before commencing the actual deepening.

b) Shaft used as an emergency exit (not coal winding). The existing shaft bottom is aranged as the top of the sinking shaft with a set of folding doors. The existing cage in the shaft may be used to wind the debris to the pit-bottom level, using a rope capped at each end, one end being attached to the underside of the cage and the other end to the kibble. The debris is raised to the existing pit-bottom level and may be either stowed in old workings or filled into tubs and raised to the surface by means of the cage.

c) Deepening carried on simultaneously with coal winding. A staple pit about 30 ft. deep is sunk at some convenient distance from the existing pit bottom (or alternately an inclined drift may be driven down). A heading is driven from the bottom of the staple pit to a point directly below the centre of the existing shaft, this point being accurately fixed by a survey. The shaft is then driven upwards to accomodate the detaching hook plates and a short distance of solid ground is left underneath the existing shaft to hold back any water and provide protection for the sinkers. A separate winding engine is installed at the surface and the sinking rope is conducted down and near the side of the existing shaft and through a borehole in the solid ground to two diversion pulleys which bring the rope back to the centre of the new sinking. A stand pipe is grouted into this borehole and left projecting in the surnp to prevent leakage of water through the borehole.

The debris from the sinking is brought up in the usual way to folding doors at the heading level and there tipned into tubs and taken up the stanle pit for disposal.

The sinking is completed in the usual way and then the length of solid ground is removed upwards to allow the two linings to be joined together.

18) Widening a Shaft

This may become necessary to increase the winding and ventilation capacities of an existing shaft.

a) A shaft not required during sinking. In this case the shaft can be filled with ashes or other small debris from bottom to top and then resunk in the ordinary way taking out the old lining, widening the shaft and then putting in the new lining.

b) A shaft required for normal winding during widening. Under these

conditions, fil-ling-in of the shaft is out of question and some other methods must be adopted. One such method is to use a special tube or shield. This, which may be about 9 ft. long and a diameter suited to that of [he old shaft, is suspended from the headgear by two ropes operated from a power winch. This tube protects the sinkers, prevents debris falling down the old part of the shaft and allows winding and ventilation to be normal.

The sinkers stand on the windened ledge to remove theold lining, do the widening and put in the temporary lining.The debris is removed by a kibble attached to the winding rope or by tubs on the existing cage

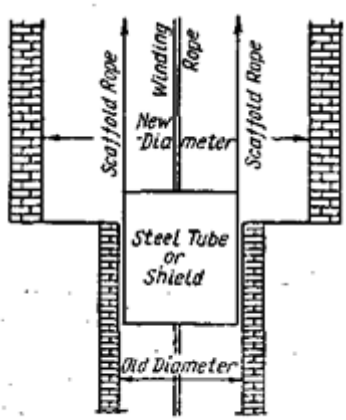

Fig. 9

When new lining is being bricked or cemented, the tube is- rested on the old lining and the rope detached and used to sling the bricking or cementing scaffold, which must have a suitable opening for the existing cage. When the scaffold is not in use it is suspended from the new brickwork or cementation above the widening. In other respects the work is as in normal practice (Fig. 9).

19) Shaft Linings

Shaft linings can be divided chiefly into two groups.

1) Lining a shaft which is dry, and therefore strength only is considered. In this case the lining most commonly used is brick, as has been previously described, and in some few cases concrete.

2) Lining a shaft which is naturally wet and the lining is required to be watertight. In this case the choice of lining may be made from *(a)* brick coffering, *(b)* concrete, or (c) cast-iron tubbing.

Brick coffering. This is often used near the surface to prevent water penetrating to the shaft. A hricking curb is laid down in impervious ground, below the water-bearing strata, and on it are built two concentric rings of brickwork in cement or hydraulic mortar with a space between, which is later grouted with cement. The space .between the outer wall and the sides of the

excavation is filled with broken bricks or rubble and is later injected with cement under pressure through holes left in the walling for this purpose. The injection is continued until the water is completely sealed off.

Concrete. This may be either plain or reinforced but usually the latter is preferred for water-bearing strata. In this case the temporary lining consists of iron sheeting supported by a structure of angle irons braced together. When a suitable length has been sunk and supported in this manner a circular wedge is

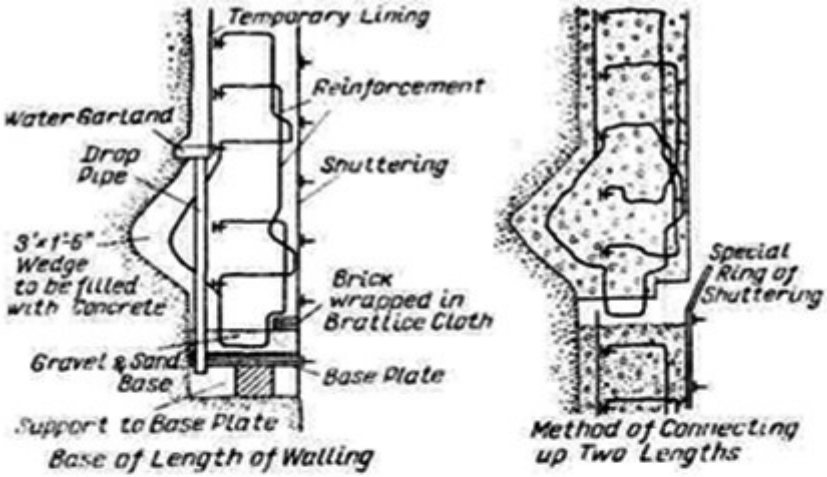

Fig. 10

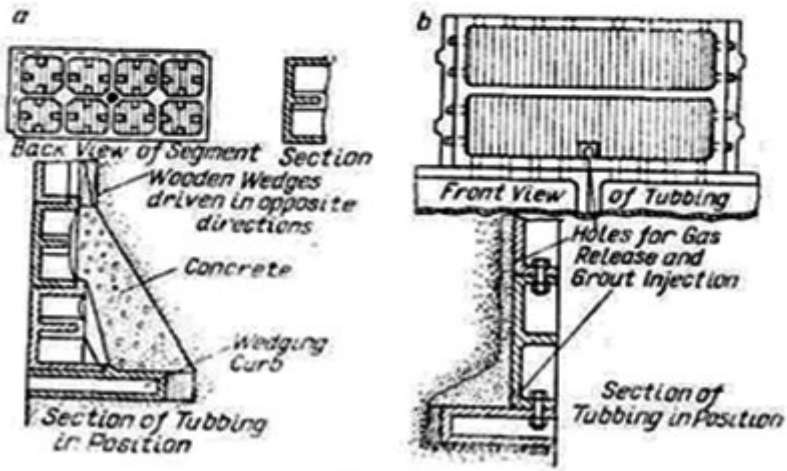

Fig. 11

cut back in the excavation and a temporary foundation put in from which is built up the internal shuttering and reinforcement, and the spaces between the sheets filled with concrete (Fig. 10).

Cast-iron tubbing. Two types are in use in Europe: English tubbing (Fig. 11, a) in which the flanges and reinforcing ribs are external; and German tubbing (Fig. 11,6) in which they are internal. Both types are in segments curved to the circumference of the shaft and of varying heights. The main difference between the two types, other than that already mentioned, is that the English type segments contain no bolts and depend entirely on wedging to keep them together, while the segments of the German type are bolted together. This gives the second type one big advantage in unstable ground as it can be built downward from a suspension ring.

The thickness of the tubbing depends on the water pressure it has to withstand, the German type being slightly lighter for equal pressure since the ribs of this type are subjected to compression whereas those of the English type are subjected to tension.

When the tubbing is being built upwards a wedging curb is installed and the rings of segments built up. The joints used in the English type are wood strips while strip lead is used with the German type. The space behind the tubbing is filled with fine concrete.

20) Shaft Sinking in Difficult Cases

Conditions which make shaft sinking by the ordinary method impossible are:

1) Loose or unstable ground, such as moss or sand.
2) Excessive feeders of water.
3) A combination of these two, such as running sand or alluvial deposits.

The best methods to overcome these difficulties are:

1) Piling (Fig. 12). This method is suitable for sinking through loose surface deposits of sand, mud, alluvium or moss of moderate thickness, about 70 ft. In modern practice interlocking steel piles are used. These are set up to form a ring on the surface and then they are driven in rotation a few feet at a time by means of a pneumatic hammer which is mounted on a crane travelling round outside the periphery. The longest length of pile used is 35 ft. but two or even three lengths may be riveted or welded together 'so that the rockhead may be reached by driving them from the surface. The whole principle is to keep the piles sufficiently in front of the excavation to prevent any inrushes of water or loose ground. The interlocking piles are practically watertight. When excavation is being done the piles may be strengthened by putting in internal rings on the way down.

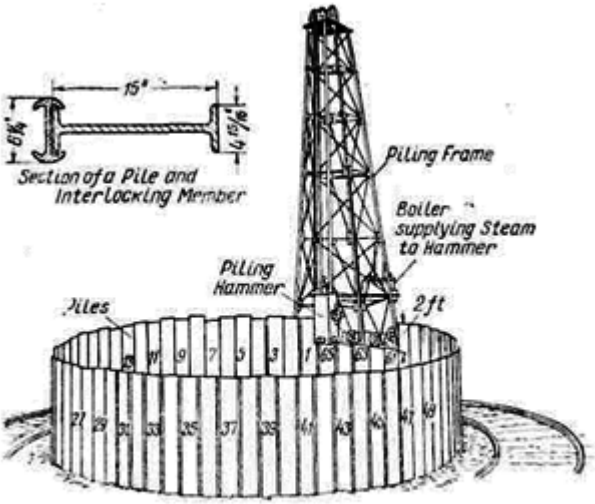

Fig. 12

When the excavation has reached the rockhead a foundation is put in and the permanent lining built UD to the surface, and sinking can then proceed in the normal manner.

2) Drop shaft or sinking drum method. In simplest form this consists of building UD the permanent lining on the 'surface, equipping it with a cutting edge and allowing it to sink by its own weight as the excavation proceeds, or forcing it down by hydraulic jacks acting against a pressure ring. The cutting edge must be kept well in advance of the excavation to prevent collapse of the sides. The two main difficulties are those of maintaining verticattfy of the shaft and 'of securing sufficient pressure to force the lining down to the

required depth. Ground containing large boulders can also create difficulties in forcing the lining down.

3) Freezing method. This method is used where unstable ground is accompanied by
water. The ground around the shaft area is frozen into a solid core so that sinking may be carried out in the normal way.

The process is divided into four principal operations:

a) Boring a large number of holes 3 ft. apart around the shaft area down to the required depth and the insertion of special tubes in these holes.

b) Circulating a freezing solution through these tubes to extract the heat from the surrounding strata until a wall of ice of sufficient size is obtained.

c) Sinking and lining the shaft through the frozen ground, this being carried out in the normal way.

d) Thawing out the ice wall and removing the circulating tubes.

4) The cementation method. With stable ground containing fissures giving off large quantities of water the cementation system is adopted. In this method, holes are bored into the sides of the shaft round the circumference and sloping slightly downwards. These are bored until water pours from them. A stand pipe is then cemented into the mouth of the hole and liquid cement injected into it at pressures up to 2000 lb. per sq. in. This penetrates into the fissures and 'pores in the rocks, sets, and thus seals off the water. The iniection is carried on until the water ceases to issue from the borehole, then sinking is recommenced and the operation repeated. The temporary lining used is as already described for reinforced concrete lining.

21) Repairing Shaft Walls

When shaft linings become defective in parts due to the pressure of bad ground, repairs have to be carried out. If the faulty area is small it can usually be tackled from a temporary scaffold built across the existing cage top, but if the area is extensive, a proper scaffold has to be installed with a grid bottom so that ventilation will not be impeded. The first operation is to put in temporary supports to the damaged part by means of rings behind which are backing deals held in position by wedges.

Holes can then be bored through the lining into the bad ground and

injections of cement made. When the bad ground has been solidified the defective part can then be removed section by section and new lining installed.

2. DRILLING AND ROADMAKING

1) Drilling

Drill. Drills May be of various types and shapes and the cutting edges may be chisel, crossed, reversed "Z". slotted, eccentric, etc. (Figs. 13-17).

Drill rods or shanks may be round, square, hexagonal or even octagonal-section, but a common type of rod is the twisted or spiral one.

The latter type serves as a rotary screw conveyor to bring the drilling smalls from the cutting edge to the mouth of the hole and to keep the whole drill free. Downhill shotholes are usually bored with this kind of rod.

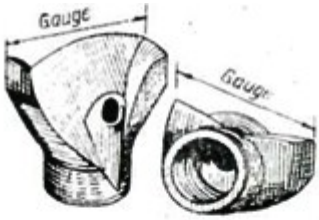

Fig. 13

Fig. 14

Fig. 15

Fig. 16

Fig. 17

Most drill shanks are hollow, and this is almost invariably so for compressed-air drills.The hole in the drill transmits exhaust air direct from the boringf machine to the cutting edge, thereby cooling it and bringing the drilling smalls away and out of the hole.

With level or uphill holes twisted drills are not so necessary, except perhaps with electric boring

machines on level or small upgrades.

Cutting edges of shothole drills were formerly solid with the shank. That is, the shank itself was widened and sharpened at the end and this cutting edge hardened and tempered. This practice is still common in relatively soft coal or strata, especially with compressed-air hammer (percussive) type drilling machines, but detachable bits are now becoming more general practice.

Detachable drilling bits have very great advantages over the other type. The shank can be made of steel better suited to withstand drilling stresses than that required for the bits. When they are dull there is no need to transport heavy drill rods to the surface. Only the lighter bits are carried by the drillers, and it is relatively easy to have a number of sharp ones on the job and maintain a sharp cutting edge throughout the shift.

Moreover, a relatively more expensive but harder steel can then be used for the bits and one suitable for taking a very hard cutting edge of tungsten carbide or some similar alloy where necessary.

Various methods are in use for attaching the bits to the drill rods, such as screw, groove and pin and sleeve.

2) Drilling Machines

Power drilling machines are now in general use and are of two types, rotary and percussive (hammer). In average work, with suitable bits, the rotary is the quicker and lighter method and can be very efficiently driven by either electric motor or compressed-air rotors.

For very hard rock the percussive is the better, and compressed-air is very suitable for this method of drilling.

Drilling stands and rigs. Devices for holding drilling machines and regulating the feed automatically are of considerable help in speeding up the rate of boring so vital to drifting. Heavier and therefore more powerful machines can be employed when they are not held by hand, thus giving greater drilling speed.

Suitably designed drilling rig is available to permit fast drilling operations to proceed whilst the debris from previous shots is being loaded. Top holes are bored first, and bottom holes can then be drilled whilst the loader is being

moved .back. When the top holes are stemmed, the shotfirer uses the rig for his platform.

3) Drifting

Placing shotholes. With each round, break-ing-in holes are bored in the form of the burn-, wedge- or pyramid-cut or step-cutting adopted.

The burn-cut consists of holes drilled straight in and spaced *2″*—3" (solid ground) apart right across the face of the drift. Alternate holes are left uncharged and act as free faces.

In the pyramid cut the "breaking-in" or "sumping" holes are drilled inwards towards a point to give them greater length for charging and stemming and by concentrating a number
of charges near the same spot they give a powerful round of simultaneous "breaking-in" shots.

The wedge cut differs in that the drill holes approach a line, and the resultant cut is wedge-shaped.

An outer ring of sumpers is sometimes bored to deepen the cut. Sumpers need not be in the centre of the drift face, but rather in the most suitable position or softest material according to variations in strata and the judgment of the senior drifter.

Easers are next drilled around the sumpers and finally the drift sides are shaped by trimmers.

Each round of holes is fired simultaneously the sumpers first, then the easers, and finally the trimmers.

With delay-action detonators the whole cycle of rounds can be "touched off" at one turn of the key of the exploder and much time saved, with improved health and safety of the shotfirer and the drifters.

Sumpers are charged with instantaneous detonators, easers with '/4 to 1 second delay, and the rest at 'A to 1 second intervals up to 4 seconds delay according to the order of the round desired.

With mechanical loading machines, difficultly is experienced in keeping them occupied reasonably near their capacity and, in addition, drilling and shotfiring interfere seriously. Boring rig and delay-action detonators provide a

means of reducing this loss of time considerably and tend to keep such loaders fully and economically occupied.

Various methods and devices are in use to speed up drifting. If the strata are not too hard and are reasonably uniform and free from hard nodules, mechanical cutters are often used.

A long jib, carrying a strong chain with specially hard-tipped cutter picks cuts out a kerf 5 to 7 in. thick across the full width of the drift and about 6 to 7 ft. or more in depth. This enables the shots to do far more useful work for much less explosive, and there is less shattering and other damage to roof, floor and sides of the excavation.

Another very useful advantage is that the permanent supports of the drift can be kept much closer to the face without damage. Compressed-air picks. Percussive picks are of very great use and real assistance in both easing the work of the drifters and speeding up the job. Soft material can often be got out more quickly and economically than by drilling and blasting, with the attendant risks and damage to supports and to roof, floor and sides.

Large stones can be easily and readily broken up into convenient sizes for loading, and the excavation quickly trimmed to smooth and proper dimensions.

4) Loading

The very high speed of development required in mining practice necessitates rapid drifting methods, and mechanical loaders of various designs are in extensive use.

Fig. 18 shows an improved loader.

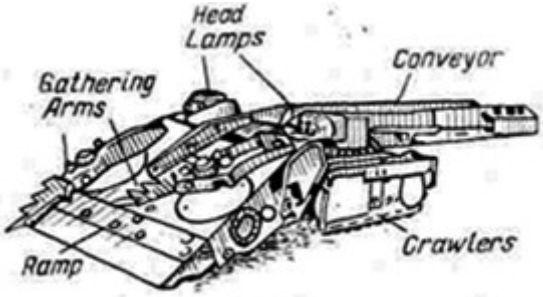

Fig. 18

The gathering head of the loader has arras which pull the stone or coal on to ramps and push it to a scraper chain conveyor which conveys it to and delivers it at the end of the jib. This jib can be swivelled horizontally and

raised or lowered to suit the tub, car or conveyor to which it is delivering. The wholemachine is self-hauling (automobile) on power-driven tractor crawlers with mechanical steering. Such loaders are expensive and require much skill in handling. Operators need relatively long periods of training, but the machine is capable of the highest speed of advance. It is not applicable in steep inclinations and the overall cost of drivage is relatively high.

5) Mechanical Shovels

There are many mechanical shovels in use and, though limited to level or only slightly graded drivages, there are quite large numbers in use underground.

The machine operates a shovel in front of it and pushes itself forward; when full, the shovel is swung over the machine and delivers into a mine car ot tub behind.

It will shunt, pull and push its own cars, delivering them into a shunt or passbye when full.

Many mining engineers favour this kind of loader in co-operation with the locomotive.

6) Transport

In mechanized drift work efficient and high-capacity transport is absolutely essential, or all the best loading devices in the world will be useless to improve on the old methods and huge amounts of capital will have been laid out and expenses incurred for nothing.

Mechanized loading is adopted to increase speed of drivage; this produces a greater amount of debris and consequently requires better transport.

Inclined drifts will most likely use rope or conveyor haulage. Downhill drivages using a slusher may have either of these, but uphill drifts lend themselves to shaker conveyors and duckbills plus a belt-type main conveyor outbye.

Local haulage systems or short robust auxiliary conveyors will save time in extensions, as they are more readily lengthened, and the main haulage or conveyor system can then be extended at suitable intervals.

In flat grades locomotives co-operate readily with power shovels and loaders.

//. *АНГЛО-РУССКИЙ ТЕРМИНОЛОГИЧЕСКИЙ СЛОВАРЬ*

О ПОЛЬЗОВАНИИ СЛОВАРЕМ

Римские цифры обозначают различные части речи.

Арабские цифры обозначают разные группы значений, внутри которых сходные слова разделяются запятой, а различные — точкой с запятой.

В квадратных скобках [ ] дается фонетическая транскрипция.

Знак ' обозначает ударение в слове и в фонетической транскрипции ставится перед ударным слогом.

В круглых скобках ( ) даются неправильные формы глаголов.

Точка с запятой внутри круглых скобок (;) разделяет Past Tense и Past Participle у неправильных глаголов; запятая же в таком случае означает, что обе формы глагола одинаково употребляются и как Past Tense и как Past Participle, например: **learn** [1ə:n] υ (learnt, learned [1ə:nt].

Одна форма неправильного глагола в круглых скобках означает, что Past Tense и Past Participle совпадают,

Одна буква с точкой заменяет заглавное слово, а две буквы с точкой — заглавное слово во множественном числе (например, **c**. вместо **colour** и **cc.** вместо **colours).**

УСЛОВНЫЕ СОКРАЩЕНИЯ

Английские

a **adjective** - имя прилагательное
adυ **adverb** — наречие
attr. **attributive** атрибутивное употребление
(в качестве определения)
cj **conjunction**— союз
n **noun** — имя существительное
pass, **passive** — страдательный залог
phr. **phrase** — фразеологическое сочетание
p1 **plural** — множественное число
p.p. **past participle** — причастие прошедшего
времени страдательного залога
pref **prefix** — приставка
prp **preposition** — предлог
v **verb** — глагол
vi **verb intransitive** — непереходный глагол
vt **verb transitive** — переходный глагол

Русские

ж.-д. — железнодорожный термин
и т. д. — *и* так далее
и т. п. — и тому подобное
лат. — латинский язык
эл. — электричество, электротехника

Знак - (дефис) обозначает соединение сложных слов. Знак = обозначает равенство.

A

account n счет; расчет; **to take into a.** phr. принимать в расчет или во внимание.

adjustment n 1. регулировка; 2. наладка; 3. пригонка; сборка; 4. подбивка.

adopt v 1. принимать; 2. утверждать; одобрять.

advance n 1. проходка; 2. продвижение; 3. подвигание (забоя).

air current phr. воздушный поток; воздушная струя.

airleg mounted machine пневматическая буровая машина.

air valve phr. воздушный клапан.

alloy n сплав.

alluvial a наносный, аллювиальный.

alluvium n (pl **alluvia)** наносные образования, аллювий.

alternate a переменный, попеременный; чередующийся.

angle n 1. угол; 2. угольник.

angle iron phr. угловая сталь или железо.

apart adv на расстоянии; с промежутками.

applicable a применимый; пригодный.

area n 1. площадь; 2. участок; отвод; 3. (шахтное) поле.

arm n 1. рычаг; плечо; 2. лапа; скребок;

gathering a. phr. погрузочный скребок или загребающая лапа.

armoured a защищенный; бронированный.

arrange v 1. устроить; 2. оборудовать.

ash ***n*** 1. зола; 2. шлак.

attendant I a сопровождающий, сопутствующий; II n работник; служащий.

automatically adv автоматически.

auxiliary a 1. вспомогательный; 2. добавочный; 3. сборочный.

available a имеющийся в распоряжении; наличный.

B

backing deals phr. затяжка стенок выработки или ствола.

barrow n тачка.

base plate phr. опорная или фундаментная плита.

bath n 1. ванна; 2. душ; 3. pl **bb.** душевая комната; 4. баня.

bed 1. постель (породы)*;* 2. пласт; 3. слой; 4. основание.

belt-type main conveyor phr. магистральный или главный ленточный конвейер.

blasting I n (взрывание шпуров); взрывные работы; II a взрывной.

block n 1. блок; 2. пробка, „мальчик"; 3. целик угля; 4. бетонный массив; **wood b.** phr. деревянная подкладка,

blow v 1. дуть; 2. нагнетать {воздух).

board n 1. доска; 2. просек, печь; 3. камера; 4. правление.

boiler n (паровой) котел.

bolt I n болт; II v соединять или стягивать болтами.

bore I v бурить; сверлить; II n скважина.

borehole = bore -hole n буровая скважина; шпур.

boring n 1. бурение; 2. буровая скважина; attr. буровой; бурильный.

boring machine phr. бурильная машина.

boring rig phr. буровая каретка; буровой станок; буровая тележка.

bottom I n 1. дно (скважины или ствола); забой; 2. площадка околоствольного двора; 3. почва пласта; II attr. нижний; **pit** b. [pit] phr. околоствольный двор.

bottom discharge hopper phr. бункер с донной разгрузкой.

boulder n*,* 1. валун; 2. галька; 3. включение.

bowk n проходческая бадья.

brace I υ 1. связывать; 2. укреплять; затягивать; II n связь; обвязка.

bracket n 1. скоба; 2. кронштейн.

brattice cloth phr. дерюга; «рогожка».

breaking-in hole phr. врубовый шпур.

breaking-in shot phr - взрывание первого или врубового шпура.

breakup v broken up разбить; раздробить.

brick I n кирпич; II attr. кирпичный;- III *v* выложить кирпичом.

bricking n кирпичная кладка.

bricking curb phr. основной венец или кольцо для кирпичной крепи.

bricking scaffold phr. подвесной полок.

brickwork n 1. кирпичная кладка;

2. кирпичная крепь.

bridle chain phr. цепь, поддерживающая подвесной полок или клеть.

broken brick phr. битый кирпич; кирпичный щебень.

bucket n 1. ведро; 2. ковш; черпак;

3. проходческая бадья; 4. грейфер.

burn-cut phr. «дробящий» вруб;

вруб с перпендикулярными к забою шпурами, часть которых не заряжается ВВ.

by hand ***phr***. вручную.

C

cable n кабель; канат; шнур; **armoured c**. phr. бронированный кабель; кабель в оболочке из гибкого замкнутого шланга; **shotfiring c**. phr. кабель или провод для взрывания.

cage I n клеть; II *v* загрузить клеть, сажать в клеть.

cage top phr. верхняя приемная площадка.

canvas bag pipe phr, брезентовый трубопровод.

capacity n 1. вместимость; 2. ёмкость; 3. производительность (машины).

capping n 1. насадка; 2. панцырь.

car n 1. (шахтная) вагонетка; 2. ***ж.-д***. вагон.

carry *v* 1. нести; 2. поддерживать; 3. выполнять, производить.

carry on *v* продолжать.

cast iron phr. чугун.

cast-iron tubbing phr. чугунная водонепроницаемая крепь.

cement I n цемент; II *v* цементировать(ся).

cementation n цементация.

cementation method phr. способ цементации (при проходке стволов шахт).

centre I n 1. центр, середина; 2. шаблон; II *v* 1. помещать (ся) в центре 2. центрировать.

centre line apparatus phr. центрирующее приспособление.

charge phr. нагружать; 2. заряжать (шпур); II n 1. груз; 2. заряд.

charging n заряжание (шпуров).

chisel bit phr. долотчатая головка бура.

circular a круглый; кольцеобразный.

circular shaft phr. ствол круглой формы.

circulate v 1. циркулировать; 2. пропускать.

circulating tube phr. циркуляционная (обводная) труба.

circumference n 1. окружность; 2. периферия.

clamp I n зажим; скоба; захват; II *v* зажимать; закреплять

clay n глина.

cluster n 1. пучок; 2. комплект; 3. штепсельная разветвленная колодка.

coal cleaning phr. обогащение угля.

coal winding phr. подъем угля; выдача угля; **coffering** n 1. футеровка; 2. крепь ствола; водонепроницаемая крепь;

brick c. phr. кирпичная водонепроницаемая крепь.

collapse n 1. обвал; обрушение; 2. осадка.

collar n 1. кольцо; 2. поясок; 3. манжета.

colliery n каменноугольная шахта.

compressed air phr. сжатый воздух.

compressed-air drill phr. пневматическая бурильная машина.

compressed-air hammer drill phr. пневматическая бурильная машина.

compressed-air main phr. трубопровод сжатого воздуха; воздухопровод.

compressed-air mechanical pick phr пневматический отбойный молоток.

compressed-air rotor phr. воздушный компрессор.

compression n 1. сжатие; компрессия; 2. сжимающее усилие.

concrete I n бетон; II attr. бетонный; III *v* бетонировать.

concrete tubbing phr. бетонная водонепроницаемая крепь; бетонный тюбинг.

concretework n 1. бетонирование; 2. укладка бетона.

conforming (to) phr. в соответствии (с).

considerably adv значительно; сильно.

consideration n 1. рассмотрение; 2. соображение; 3. внимание; **to take into c.** phr. принимать во внимание.

convenient a подходящий; удобный.

convey *v* доставлять; транспортировать.

conveyor n конвейер; транспортер.

conveyor haulage phr. конвейерная откатка.

conveyor jib phr. разгрузочная консоль конвейера.

co-operation n совместная работа; взаимодействие; **in c. with** phr. в соединении с; вместе с; совместно.

core n 1. сердечник; 2. керн; 3. столб;

solid c. phr. твердый цилиндр.

coupling 1. n соединение; 2. муфта.

course n 1. курс; 2. порядок; 3. заходка; 4. пласт [угля].

crane n подъемный кран.

crawler *n.* гусеница; гусеничный ход.

crib n венец шахтной крепи.

cross bit = **crossed bit** phr. крестовая коронка.

cross-piece phr. поперечина; распорка; траверса.

curb n 1. основной венец крепи; 2. основание крепи; 3. башмак.

current of air phr. воздушный поток: воздушная струя.

curve I *v* гнуть; изгибать; II *n* кривая (линия).

curved fish plate phr. изогнутая стыковая накладка. **cut** I **v** подрубить; зарубать; n вруб.

cut down *v* (cut down) снизить; сократить.

cutter n врубовая машина.

cutter pick phr. зубок врубовой машины.

cutting n 1 срезание; 2. подрубка; 3. выравнивание поверхности (для строительства).

cutting edge phr. 1. резец; лезвие; 2. режущий башмак; 3. головка бура; буровая коронка.

cycle of rounds phr. комплект шпуров.

D

damage I v повреждать; II n 1. повреждение, вред; 2. ущерб.

deal with v разбирать; 2. заниматься: 3. трактовать;
4. освещать (в печати).

deep 1 a глубокий; II adv в глубину.

deepen *v* углублять.

deepening n углубка [ствола].

defective a 1. дефективный; 2. поврежденный.

delay I n замедление; II attr. замедленный; замедленного действия.

delay action detonator phr. детонатор замедленного действия.

deliver *v* 1. доставлять(ся); 2. разгружать(ся).

deposit *n* месторождение; залежь; россыпь; **alluvial d.** россыпь.

depth *n* 1. глубина; 2. высота; 3. мощность.

design I *n* 1. конструкция; 2. проект; II *v* проектировать.

detachable bit phr. съемная коронка или головка [бура].

detaching hook plate phr. расцепное устройство [у клети).

detail *n* деталь; подробность; **in d**. phr. подробно.

detonator *n* детонатор; воспламенитель.

development *n* 1. подготовительные работы; подготовка месторождения; 2. проходка подготовительных выработок.

device *n* 1. прибор; приспособление; 2. механическое устройство; механизм.

dewater *v* 1. отливать воду; 2. осушать; дренировать.

dewatering *n* 1. водоотлив; 2. дренирование; осушение.

diameter *n* диаметр; поперечник;

finished d. phr. окончательный диаметр.

dig [dig] *v* копать.

digging *n* копание; зачерпывание (напр., ковшом)

dip [dip] *n* 1. падение; 2. уклон; **to the d. side** phr. по падению.

dip side phr. нижняя часть наклонной выработки.

direct или [di'rekt] I *a* 1. прямой; 2. *эл.* постоянный; II *v* управлять; направлять; III adv прямо; непосредственно.

discharging *n,* 1. разгрузка; выгрузка; 2. навалка; опрокидывание.

disposal *n* 1. удаление; 2. уборка; 3. отвал.

disturb *v* нарушать; повреждать.

disused *a* оставленный; покинутый; заброшенный.

disused shaft phr. (оставленный или заброшенный) старый ствол.

diversion pulley phr. отводной шкив (для канатной передачи).

double drum winch phr. лебедка с двумя рабочими канатами.

downhill drivage phr. направленная вниз выработка; выработка по падению.

downhill shothole phr. направленный вниз шпур.

downwards adv вниз.

drain *n* водоотливная труба, спускная труба; 2. водосток; 3. канава; штрек для отвода воды; II *v* отливать; обезвоживать; дренировать; III attr. водоотливный.

drainage *n* водоотлив; осушение: дренаж.

drain pipe phr. спускная труба; водоотливная труба; дренажная труба

drift I *n* 1. выработка; 2. штрек; 3. квершлаг; II *v* проходить выработку.

drifter *n* 1. проходчик; 2. перфоратор.

drifting *n* проведение горизонтальных горных выработок.

drill I *v* бурить; II *n* бур; перфоратор; сверло; III attr. буровой.

driller *n* бурильщик.

drilling I *n* бурение; II attr. буровой.

drilling machine phr. механический бур; буровая каретка; бурильная машина.

drilling rig phr. буровой станок; буровая каретка; буровая тележка.

drilling smalls phr. буровая мука; буровая мелочь.

drilling stand phr. буровой станок; буровая каретка; буровая тележка.

drilling stress phr. напряжение при бурении.

drill rod phr. буровая штанга; стержень бура.

drill shank phr. хвостовик бура.

drivage n проходка; выработка.

drive I *v* 1. проходить; 2. приводить (в движение);

3. забивать (*сваи);* II *n* привод; III attr. приводной.

drop shaft *phr.* опускная крепь.

drum *n* 1. барабан; 2. цилиндр; 3. ворот; 4. башмак; **sinking d.** phr. [проходческий) башмак; башмак опускной крепи.

E

easer *n* вспомогательный шпур.

eccentric I *a* экцентрический; эксцентриковый; II *n* эксцентрик.

economic proposition phr. выгодное предприятие или дело.

edge *n* 1-. край, кромка; 2. лезвие; грань; **inside e.** phr. внутренний край.

electric(al) *a* электрический.

electric motor phr. электродвигатель.

elevation *n* 1. подъем; возвышение; 2. вертикальный разрез.

elliptical *a* эллиптический.

emergency exit phr. запасный выход.

employ *v* применять, употреблять.

enable *v* давать возможность.

engine *n* 1. машина, двигатель; 2. инструмент.

entail *n* 1. вызывать; 2. требовать.

excavation *n* 1. горная выработка; 2. выемка грунта.

excessive *a* 1. чрезмерный; 2. обильный.

exhaust air высасываемый воздух; выхлопной газ.

existing *a* 1. существующий; 2. остающийся, оставшийся (в целости)

existing shaft 1. действующий ствол; 2. оставшийся ствол; сохранившийся ствол

expense *n* затрата; расход.

expensive *a* дорогой; дорогостоящий.

exploder n(электрическая) взрывная машинка;

электровоспламенитель;

key of the e. phr. переключатель электровоспламенителя.

explosive I *n.* взрывчатое вещество; II *a* взрывчатый.

extend *v* удлинять.

extension *n* удлинение.

extensive a большой; обширный; значительный.

extent *n* 1. протяжение; размер; 2. степень; мера.

external *a* внешний; наружный.

extra bridle chain phr. дополнительная предохранительная цепь (для полка или клети).

eye bolt phr. болт с ушком или петлей.

F

face n 1. забой; грудь забоя; 2. поверхность;

free f. [fri:] phr. плоскость обнажения.

facility n 1. легкость; 2. способность*; pl* ***ff.*** 1. оборудование; 2. средства.

fairly ad*v* довольно, достаточно.

fan *n* вентилятор; **forcing type of f.** *phr.* нагнетательный вентилятор.

fast flowing air current phr. сильный воздушный поток; сильная струя воздуха

fault n 1. сдвиг; 2. сброс; 3. нарушение.

faulty area phr. поврежденный участок.

feed I *n* 1. питание; подача; 2. подающий механизм; II *v* 1. питать; подавать; 2. нагнетать.

feeder *n* 1. питатель; 2. толкатель; 3. всасывающий рукав; всасывающий патрубок; 4. приток.

filling-in *n* заваливание, заполнение.

fine concrete phr. чистый бетон (без примесей).

fire *v* 1. зажигать; 2. взрывать (шпуры).

fish-plate phr. стыковая накладка; **curved f. p.** phr. изогнутая стыковая накладка.

fissure *n* 1. трещина (в породе); щель; 2. излом; II ***v*** трескаться

fitting *n* 1. оборудование; монтаж; 3. арматура.

flange *n* 1- край, кромка; 2. ребро; борт; фланец.

flat *a* 1. плоский; 2. пологопадающий.

flat grade phr. пологий уклон; пологое падение.

flat seam phr. Горизонтальный или
пологопадающий пласт.

floor *n* 1. подошва выработки; почва; 2. настил; пол.

folding doors phr. створчатые дверцы или ляды.

force I *n.* вгонять: забивать; 2. нагнетать; II *v* 1. сила; 2. нагнетание.

forcing type of fan phr. нагнетательный.

for nothing phr. попусту; даром.

foundation n основание; фундамент.

frame *n* 1. рама; 2. сруб; 3. каркас; 4. подставка.

free face phr, плоскость обнажения.

freeze 1 *vt* (froze [frouz]; frozen [frouzn]) замораживать; 2. *vi* замерзать.

freezing *n* замораживание.

freezing method phr. способ замораживания.

freezing solution phr. замораживающий раствор.

ft. = **foot** I *n* фут (=30,5 *см.);* II *attr*. (в сложных словах) -футовый

fume *n* дым; копоть; *pl* ff. продукты взрыва; **toxic ff.** phr. вредные газы; отравляющие газы.

G

garland *n.* 1. лоток; 2. водосборное кольцо (в стволе); **water g**. phr. лоток в стволе для улавливания воды.

gathering arm phr. погрузочный скребок или загребающая лапа.

gathering head phr. натяжная головка.

gelignite n гелигнит (взрывчатое вещество).

give off v given off 1. отдавать; 2. выделять (напр. воду).

grab-crane *n* грейферный кран.

graded *a* наклонный.

graduated a 1. разделенный; 2. градуированный.

gravity *n* тяжесть; сила тяжести.

grid bottom phr. 1. решетчатое дно; 2. пол из планок.

groove and pin phr. 1. стопорный штифт; 2. соединять на шпонках.

ground *n* 1. почва; порода; грунт; 2.поверхность, основание.

grout I *v* цементировать; заливать раствором; II *n* известковый *или* цементный раствор.

guide I *v* направлять; II *n* направляющая; проводник.

guide rope phr. направляющий канат.

guide shoe phr. направляющий башмак.

H

hammer п 1. молот; баба; 2. молоток (бурильный); **pneumatic** h. phr.

пневматический молоток;

steam h. phr. паровой молот.

hand *n* 1. рука; 2. подсобный рабочий II attr ручной; **by h**. phr. вручную.

handling *n* 1. транспорт; 2. уборка; 3. подача; доставка; 4. обращение; 5. управление.

hanger ; *n* 1. подвесной болт крепи; 2. крюк; 3. кронштейн.

hard nodule *phr.* 1. твердое включение; 2. рудная почка; конкреция.

hard-tipped *phr*. армированный твердым сплавом.

harden *vi* 1. твердеть; затвердеть; 2. закалять.

haulage *n* откатка.

head *n* 1. (напор води); 2. головка; **static h.** *phr.* статический напор *(воды).*

header *n* 1. головная часть; 2. проходческая машина (для подготовительных выработок); проходческий щит; 3. водосборник; коллектор.

headgear *n* копер; буровая вышка.

heading *n* 1. выработка (по пласту); 2. штрек; 3. штольня; 4. ход; просек.

head lamp *phr.* головная лампа, фара; 2. шахтерская лампочка (на шлеме).

height *n* 1. высота; 2. уровень; 3. ширина.

hexagonal. *a* 1. шестиугольный; 2. шестигранный.

high-capacity *phr.* высокая производительность; *attr.* высокопроизводительный.

hilly ***a*** *1*. холмистый; 2. пересеченный (о местности).

hilly ground *phr.* холмистая или пересеченная местность.

hinge *n* петля; шарнир; **strap h.** *phr.* (накладная) петля (напр., дверцы*).*

hole *n* 1. отверстие; паз; 2. буровая скважина, шпур; **square h.** *phr.* квадратный паз.

hollow *a* 1. полый; 2. пустотелый.

hoppet = hoppit *n* проходческая бадья.

horizontal arm *phr.* горизонтальная распорка.

hosing *n* шланги.

hydraulic cement *phr.* гидравлическое связывающее вещество; связывающее вещество, твердеющее в воде.

hydraulic jack phr. гидравлический пресс.

I

impact *n* удар; толчок.

impede *v* 1**.** мешать; 2. задерживать.

impervious *a* (водо)непроницаемый.

improve *v* 1. улучшать; 2. повышать,

in. = **inch** I *n* дюйм (=2, 54 *см);* II *attr.* дюймовый.

inclination *n* уклон, скат; наклон; угол падения (пласта).

inclined *a* наклонный.

inclined seam *phr.* наклонный пласт.

incur *v* производить (апр., расходы).

infiltration *n* 1. просачивание; 2. проникновение.

inject *v* 1. вводить; 2. впрыскивать; 3. вливать; 4. нагнетать.

injection *n* 1. нагнетание; 2. пропитывание.

inner *a* внутренний.

inner ring комплект врубовых шпуров.

inrush *n* 1. напор (хлынувшей воды); 2. прорыв (плывуна).

insertion *n* 1. вставка; 2. прокладка; 3. проведение.

inside I *a* внутренний; II *adv* внутрь; внутри.

instantaneous *a* 1. мгновенный; мгновенного действия; 2. одновременный.

interfere *v* 1. вмешиваться; 2. мешать.

interlock *v* 1. блокировать; 2. соединять в замок.

interlocking I *a* плотно прилегающий; II *n* блокирование; *ж.-д.* блокировка.

internal *a* внутренний.

inwards *adv* внутрь.

issue *v* 1. выходить; 2. вытекать; 3. просачиваться.

J

jib *n* 1. бар врубовой машины; 2. механизм для передвижения; 3, стрела (*напр., крана).*

joint I *n* соединение; шов; стык; II *v* соединять; сочленять; III *a* соединенный.

judgement = **judgment** *n* суждение; усмотрение.

К

keep *v* (kept [kept]) держать; поддерживать; сохранять.

keep in advance *phr.* опережать.

kerf *n* 1. вруб; зарубная щель; зарубка; 2. выемка.

kettle *n* 1. котел; 2. проходческая бадья.

kibble *n* проходческая бадья.

L

ladder *n* лестница; **wire-rope 1.** *phr.* лестница из проволочного каната.

lay down *v* (laid down ['leid 'daun]) укладывать (напр., бетон).

layer *n* 1. слой; 2. пласт.

laying off *phr.* 1. отмеривание; 2. прокладка, трассировка; 3. планировка.

l a y o u t *v* (laid out .['le'id 'aut]) 1. выложить; 2. затратить; З. запланировать.

lb. = pound *n* фунт (=453,6 *г).*

lead *n* вводный ила подводящий провод.

leakage *n* 1. утечка; 2. просачивание.

ledge *n* выступ; кромка; консоль;

rock I. *phr.* выступ породы.

length *n* 1. длина; 2. отрезок, кусок; **in 1**. *phr.* в длину; длиной.

lengthen *v* удлинять(ся).

level I *n* 1. горизонт; 2. уровень; II *a* ровный; горизонтальный; III *v* выравнивать.

light I v (lit [lit], lighted ('laitd) 1. освещать; 2. зажигать; З. загораться; II *n* свет;

освещение; III *a*

1. светлый; 2. легкий; облегченный.

lighting *n* освещение.

lining *n* крепь, облицовка, обшивка.

liquid cement *phr.* цементный раствор.

load I *n* груз; нагрузка; погрузка; II *v* 1. грузить, нагружать, погружать; наваливать; 2. заряжать.

loader *n* погрузочная машина; погрузчик.

loading I *n* погрузка; загрузка; II. *attr.* погрузочный.

local haulage *phr.* вспомогательная откатка.

lock-coil rope *phr.* канат закрытой конструкции.

locomotive *n* 1 локомотив; 2. электровоз.

loose ground *phr.* рыхлая порода; неустойчивая порода.

loss of time потеря времени; простой,

machinery *n* машины; 2. механическое оборудование.

main I a 1. главный, основной; 2. магистральный; II *n* 1. главная часть; 2. трубопровод; 3. *pl* магистраль.

main haulage *phr.* главная откатка.

main runner *phr.* главная направляющая.

maintaining *n* 1. поддержание; 2. сохранение.

master sinker *phr.* бригадир смены проходчиков.

means *n pl* средство; **by m. of** *phr.* посредством.

mechanical cutter *phr.* врубовая машина.

mechanical loader *phr.* погрузочная машина.

mechanical loading machine *phr.* механическая погрузочная машина.

mechanical shovel *phr.* механическая лопата; экскаватор.

mechanized drift work *phr.* механизированное проведение горизонтальных горных выработок.

mechanized loading *phr.* механизированная погрузка.

mine car *phr.* шахтная вагонетка.

mining engineer *phr.* горный инженер.

mortar *n* строительный раствор; **hydraulic m.** *phr.* гидравлический раствор (твердеющий в воде*).*

moss *n* 1. мох; 2. торфяник.

motor *n* двигатель, мотор; **electric m.** *phr.* электродвигатель.

mouth *n* 1. устье выработки или скважины; 2. отверстие; 3. выход.

N

necessitate *v* вызывать необходимость; требовать.

number I *n* 1. число; 2. номер; a п. of phr. целый ряд; очень много; II *v* нумеровать.

O

oak *n* дуб.

octagonal *a* восьмиугольный.

operator *n* механик; машинист.

outby(e) adv по направлению от забоя к стволу.

outer *a* внешний; наружный.

outer hole phr. вспомогательный или отбойный шпур.

output *n* 1. добыча; выдача, 2. продукция; 3. отдача.

outside I *a* наружный; II *adv* наружу; снаружи. **overall cost** phr. общая стоимость.

overcome *v* overcome преодолеть.

P

part *n* 1**.** часть; 2. участок.

passbye *n* 1. разъезд; разминовка; 2. запасной путь.

penetrate *v* 1**.** проникать 2. просачиваться; 3. заполнять; пропитывать.

percussive *a* ударный; вибрационный.

percussive drilling *phr.* ударное бурение.

percussive pick *phr.* отбойный молоток.

permanent *a* 1. постоянный; 2. прочный; 3. неизменный.

perspective *n* 1. перспектива; вид; 2. освещение [вопроса].

pick I я 1. зубок; 2. кайла; отбойный молоток; II *v* отбивать; **cutter p.** *phr.* зубок врубовой машины.

pile driving *phr.* забивка свай.

piling *n* 1. забивка свай; 2. забивная [вертикальная] крепь.

piling frame *phr.* копер (или станина) сваезабивной установки.

piling hammer *phr.* молот для забивания свай.

pit bottom *phr.* 1. забой ствола; 2. околоствольный двор.

placing *n* размещение; расположение.

plug I *n* 1. пробка; клин; 2. болт; 3. репер; II *v* 1. забивать; 2. ставить репер.

plumbing *n* замеривание отвесом.

pore *n* 1. пора; 2. пустота; отверстие; скважина.

pour *v* лить(ся); выливать(ся).

power I *n* мощность; энергия; II *attr.* механический; с механическим (электрическим и т. п.*)* приводом.

power-driven *phr.* с механическим *(*электрическим*)* приводом.

power winch *phr.* механическая лебедка.

precaution *n* предосторожность; мера предосторожности.

pressure *n* 1. давление; 2. напор.

pressure ring *phr.* прессовое кольцо; упорное кольцо.

proper *a* 1. надлежащий; 2. настоящий.

prove *v* 1. доказывать; обнаруживать; 2. детально разведывать 3. оказываться.

prove the coal *phr.* разведать угольный пласт.

pull on *v* загребать.

pulley I *n* блок; шкив; ворот; II *v* действовать посредством блока-или шкива.

pump I *n* насос; II *v* откачивать (воду) насосом; **shaft p.** *phr.* шахтный насос.

pumping *n* откачка (воды) насосами; водоотлив.

pump out *v* откачивать (воду) насосом.

push oneself forward *v* подвигаться; продвигаться.

put in *v* 1. вставлять; 2. возводить (напр., крепь).

pyramid cut *phr.* пирамидальный вруб.

Q

question *n* вопрос; is **out of q**. *phr.* исключается.

R

radius rod *phr.* рейка для измерения радиуса [ствола].

rag bolt = ragbolt *phr.* 1. заёршенный болт (или. клин)*;* ёрш; 2. анкерный болт.

raising *n* подъем; поднимание.

ramp *n* рампа; полок (для загрузки скребкового конвейера).

rate *n* 1. скорость; 2. расчет; 3. степень; 4. норма; II *v* ценить; оценивать.

readily *adv* быстро.

reasonably *adv* достаточно; довольно.

recommence *v* начинать снова.

rectangular *a* прямоугольный;

reel *n* 1. катушка; бобина; 2. барабан; 3. ворот.

reinforced concrete *phr* железобетон.

reinforced concrete lining *phr.* железобетонная крепь.

reinforcement *n* 1. укрепление; 2. арматура (для железобетона).

reinforcing ribs *phr.* ребра жесткости.

relatively *adv* сравнительно.

release *n* 1. освобождение; 2. выпуск; **gas r**. *phr.* выделение *или* выпуск вредных

газов.

relieve *v* облегчить; 2. смягчить.

remove *v* удалять.

repair I *n* ремонт; II *v* ремонтировать; исправлять.

resink *v* resunk проходить (ствол) вновь.

resistant *a* устойчивый; неповреждаемый.

rest *n* остаток; **the r**. *phr.* остальные.

reversed "Z„-bit *phr.* зетообразная головка бура.

rider *n* направляющая рама бадьи; проводник.

rig *n* оборудование для бурения; **boring r.** = **drilling r.** *phr.* буровой станок; буровая тележка; буровая каретка.

ring *n* 1. кольцо; 2. ряд; 3. комплект (шпуров); **inner r.** *phr.* комплект врубовых шпуров; **skeleton r.** *phr.* направляющее кольцо.

risk *n* риск; опасность.

rivet I *n* заклепка; II *v* клепать; заклепывать.

road *n* 1. дорога; 2. подземная выработка; штрек.

roadmaking *n* проведение штреков.

robust *a* крепкий; прочный.

rockhead *n* верхний слой крепкой породы (при проходке ствола).

rod *n* 1. стержень; штанга 2. брус; 3. рейка;

roof *n* I. кровля выработки; 2. перекрытие.

rope I *n* канат; II *attr.* канатный; **winding r.** *phr.* подъемный канат.

rotary *a* вращательный; роторный.

rotary drilling *phr.* вращательное бурение.

rotation *n* 1. вращение; 2. последовательность; чередование; 3. порядок следования.

rotor *n* ротор; *эл.* сердечник.

round I *n* I. комплект шпуров; 2. ряд; II *a* круглый; III *v* поворачивать(ся).

rubber I *n* резина; II *attr.* резиновый.

rubble *n* 1. щебень; 2. бут; балласт.

runner *n* 1. проводник; направляющая; брус (в шахте); **rr**. пальцы (у полка); **cross r.** *phr.* поперечная балка или брус.

running sand *phr.* 1. сыпучий песок; 2. оползень; 3. плывун.

S

safety *n* 1. безопасность; 2. техника безопасности.

save 1. экономить, сберегать; 2 спасать.

scaffold *n* 1. подмостки; леса; 2. полок; **walling s.** *phr.* подвесной полок.

scaffold rope *phr.* канат подвесного полка.

scope *n* сфера; охват; **it does not lie in the s.** *phr.* не входит в задачу.

scraper chain conveyor *phr.* скребковый цепной конвейер.

screw conveyor *phr.* винтовой конвейер; шнек.

seal off *v* 1. изолировать; 2. устроить перемычку.

seat *n* 1. основание; опорная поверхность; 2. опорные края.

segment *n* сегмент; сектор.

self-filling *a* самозаполняющийся.

self-hauling *a* самоходный.

senior drifter *phr.* бригадир, начальник смены проходчиков.

set I *v* (set [set]) 1. ставить, устанавливать; 2. оседать; 3. подбить; 4. схватываться (о цементе); *5.* возникать; **II** *n* 1. установка; 2. набор; 3. комплект (шпуров); 4. агрегат; 5. состав; 6. оклад (срубовой крепи); 7. свита пластов.

set off *vt* (set off) 1. отмерить;2. размерить.

set up I *v* (set up ['set'Ap]) 1. устанавливать; воздвигать; 2. возникать; 3. вызывать; II *n* 1. установка; 2. устройство; 3. монтаж,

shackle *n* 1. ушко; 2. скоба, серьга; 3. карабин.

shaft *n* 1. ствол; шахтный ствол; 2. шахта; 3. вал, ось.

shaft bottom *phr.* 1. околоствольный двор; 2. забой ствола.

shaft top *phr.* поверхность шахты.

shaft-top timbers *phr.* 1. надшахтный деревянный каркас; 2. надшахтная деревянная крепь.

shaker conveyor *phr.* качающийся конвейер.

shallow *a* мелкий; неглубокий.

shallow depth *phr.* незначительная глубина.

shank *n* хвостовик бура; затылок бура; ручка бура.

shape 1 *n* 1. форма; 2. профиль; 3. контур; II г; 1. придавать форму; 2. отделывать; подчищать.

sheeting *n* 1. обшивка; 2. опалубка; 3. затяжка; **iron s**. *phr.* железная обшивка.

sheet iron *phr.* листовое железо, черная жесть.

shield *n (проходческий)* щит.

shot *n* взрывание; взрыв; заряд.

shotfirer *n* взрывник.

shotfiring *n* взрывание шпуров.

shotfiring cable phr. кабель или провод для взрывания (шпуров).

shothole *n* шпур; **downhill s**. *phr.* шпур, направленный вниз.

shothole drill *phr.* бур для (бурения) шпуров.

shovel *n* механическая лопата; ковш; экскаватор.

shunt I *v* 1. отводить; переводить; 2. *ж.-д.* маневрировать; II *n* 1. запасной путь; стрелка; 2. *эл.* шунт; III *attr.* шунтовой.

shuttering *n* затяжка; опалубка.

side *n* 1. бок; 2. сторона; 3. стенка (выработки или ствола).

side piece *phr* боковая стенка.

siding *n* 1. боковая выработка; 2. подъездной путь; запасный путь.

simultaneously *adv* одновременно.

sink *v* sunk проходить ствол; углублять; опускать; II *n* слив.

sinker *n* проходчик; **master s**. *phr.* начальник смены проходчиков.

sinking I *n* проходка *(ствола);* II *attr.* проходческий.

sinking kibble *phr.* проходческая бадья.

site *n* 1. местоположение; 2. участок (для строительства).

size *n* 1. величина, размер; 2. сечение.

skill *n* 1. искусство, умение; 2. квалификация.

sleeve *n.* втулка; муфта.

sliding bolt *phr.* направляющий болт *или* шток.

slope I *v* 1. наклонять; 2. проходить с уклоном; проходить наклонный ствол; II *n* 1. уклон; 2. наклонный ствол.

slotted bit *phr.* фрезерная головка бура.

slusher *n* волокуша; породопогрузочная машина; скрепер.

smoke I *n* дым; копоть; испарение; II *v* дымить(ся).

soft ground *phr.* 1. слабый грунт; рыхлая почва; 2. плывун.

solid ground *phr.* крепкая порода.

solidify *v* 1. уплотнять(ся); 2. твердеть; 3. застывать.

solid with *phr.* за одно целое с. . .

space *n* 1. место; пространство; II *v* размещать.

special steel *phr.* легированная сталь.

speed *n* скорость; быстрота.

speed up 1. *v* ускорять; доводить до полной скорости; 2. *n* скорость.

spiral *a* спиральный; винтовой.

sprag *n* распорка; подпорка.

square 1 *a* квадратный; II я 1. квадрат;
2. прямоугольник.

sq.in. = square inch *phr.* квадратный дюйм.

stable *a* 1. устойчивый; 2. стабильный;
3. крепкий.

stand pipe *phr.* **1.** патрубок; 2. перпендикулярная труба; 3. стояк.

staple pit *phr.* гезенк.

steam raising *phr.* парообразование, генерирование пара.

steel I *n* сталь; II *attr.* стальной; **mild s.** *phr.* 1. мягкая сталь; 2. литая сталь.

steep inclination *phr.* крутой угол падения (пластов).

steering *n* 1**.** управление; рулевое управление; 2. ведение.

stem I *v* забивать шпуры; II я 1. тело (бура); 2. стержень; 3. забойка.

stemming *n* забойка (шпура); пыж.

step-cutting *phr.* уступный вруб (ступенчатое расположение шпуров),

stout *a* 1. крепкий, прочный; 2. выдержанный; 3. основательный.

stow *v* закладывать; заложить.

strap I *n* 1. накладка; 2. планка; 3. ремень; 4. полоса; II *attr.* полосовой.

strap hinge *phr.* шарнирная петля (напр., у дверцы).

strata *pl* от **stratum** напластования; свита пластов.

stratum *n* 1. отложение пород; пласты; 2. толща.

strengthen *v* 1. укреплять; 2. усиливать.

stress *n* усилие; напряжение.

stretcher *n* 1. ширительная машина; 2. поперечная ферма.

strip *n* 1. прокладка; 2. подкладка; **wood s.** *phr.* деревянная прокладка.

strip lead *phr.* свинцовая прокладка.

strut 1 *n* I. подпорка, стойка; 2. подкос; II *v* подпирать; опираться.

subject *n* 1. предмет; 2. тема

sub-soil *n* подпочва; грун

suit *v* 1. подходить; соответствовать; 2. подгонять.

suitable *a* 1. подходящий; пригодный; 2. удобный; 3. соответствующий.

suitably *adv* соответствующим образом; надлежащим образом.

sump *n* 1. зумпф; первоначальный вруб; 2. колодец; 3. водосток.

sumper *n* врубовый шпур.

sumping hole *phr.* Врубовый шпур.

supply *n* 1. снабжение; 2. подача; 3. питание.

support 1 *n* 1. поддержка; опора; 2. крепь; II *v* 1. поддерживать; 2. крепить.

surface *n* земная поверхность; поверхность.

surface building- *phr.* надшахтное сооружение *или* здание.

surface deposits of sand *phr.* песчаные наносы. **surface-soil** *phr.* Поверхностный слой почвы.

survey *n* маркшейдерская (подземная) съемка. **suspend** *v* подвешивать.

suspension ring *phr.* Кольцо для подвешивания (крепи)

suspension rope *phr.* канат для подвешивания (напр., подвесного полка).

sweep *v* 1. вымести; 2. вынести; 3. удалить.

swing *v* поворачивать(ся); разворачивать(ся).

swinging *n* раскачивание.

swivel v поворачивать(ся); II *n* шарнирное соединение; III *a* поворотный.;

T

tackle *v* взяться (напр. за ремонт); ремонтировать. **temper** *v* 1. быстро охлаждать; от-

пускать: 2. улучшать структуру металла термической обработкой.

temporary *a* временный.

tend *v* способствовать.

tension *n* 1. растяжение; 2. растягивающее усилие.

test I *n* проба; испытание; опыт; II *v* подвергать испытанию; III *a* пробный.

thaw out *v* оттаивать; растоплять.

thick *a* толстый; **an inch t.** толщиной в один дюйм; 2. мощный (напр., пласт),

thickness *n* 1. толщина; 2. мощность (пласта).

timber 1 *n* I. крепежный лес; лесоматериалы; 2. деревянная крепь; 3. бревно: брус; II υ крепить (деревом); закреплять; **oak t**. *phr.* дубовая балка или брус.

timber lining *phr.* деревянная крепь; деревянная затяжка.

time *n* время.

time interval 1 n *phr.* 1. перерыв; 2. простой.

top 1. верх; 2. кровля выработки; 3. выступ; 4. приемная площадка; II *attr.*

верхний.

"touch off" *v* 1. выпалить; 2. взорвать.

training *n* производственная подготовка.

transport *n* 1. транспорт; 2. транспортирование; перевозка;3. транспортные средства.

travel *v* двигаться, передвигаться, перемещаться.

treat *v* 1. трактовать; 2. разбирать; 3. излагать

trim *v* подчищать.

trimmer *n* триммер; шпур для выравнивания (стенок выработки).

trim off *v* 1. подчищать; 2. выравнивать (почву).

tub *n* 1. бадья; 2. ящик для руды или породы; шахтная вагонетка; II *v* крепить водонепроницаемой крепью.

tubbing *n* возведение водонепроницаемой крепи; водонепроницаемая крепь; тюбинговая крепь.

tube *n* труба; трубка; **sheet-iron t.** *phr.* жестяная труба.

tubular column mounting *phr.* трубчатая опорная колонка.

tungsten carbide *phr.* карбид вольфрама *(для армирования коронок),*

turbine *n* турбина.

turbine type *phr.* турбинный; турбо- (напр., турбонасос).

turn 1 *v* вертеть; вращать; II я 1. оборот; поворот; **at one** t. *phr.одн*им поворотом.

twisted *a* спиральный; винтовой.

U

uncharged а незаряженный.

underground I *adv* под землей; II *a* подземный.

underside *n* 1. нижняя часть; 2. дно.

unstable ground *phr.* неустойчивая порода; плывун.

up-grade I *n* подъем; II *adv* вверх по уклону.

uphill I *adv* в гору; II а восстающий; направленный вверх.

uphill drivage *phr.* восстающая выработка.

use I *n* 1. применение; 2. польза; **to be in u**. *phr.* применяться; II *v* применять; употреблять; *pass,* применяться.

V

verticality *n* вертикальное *или* отвесное положение.

vertical limb *phr.* вертикальная стойка.

W

wall I *n* стена (выработки)*; II v* крепить (стенки ствола)*;* обносить стеной.

walling n 1. возведение стен; 2. стены (из кирпича или камня).

waliing-scaffold *phr.* полок, с которого производится крепление; подвесной полок.

wall of ice *phr.* ледяная стена; ледяной цилиндр.

water barrel *phr.* водоотливная бадья.

water-bearing *a* водоносный.

water garland *phr.* водосборное кольцо *или* лоток (в шахтном стволе).

water pipe *phr.* водопроводная труба.

water pressure *phr.* гидростатическое давление.

watertight *a* 1. водонепроницаемый; 2. герметический.

wedge I *n* клин; II υ 1. вбивать клин; заклинивать(ся); 2. расклинивать.

wedgecut *phr* клиновый вруб.

wedge-shaped *phr.* клинообразный.

wedging curb *phr.* основной заклиненный венец водонепроницаемой крепи.

weight I *n* вес; 2. тяжесть; груз; **by its own** w. *phr.* под собственной тяжестью.

weld I *n,* сварка; II *v* сваривать(ся).

wet shaft *phr.* мокрая шахта.

widen *v* расширять.

widening *n* расширение (ствола).

winch I n 1. лебедка, ворот; домкрат; II *v* поднимать лебедкой *или* воротом

double drum w. *phr.* лебедка с двумя рабочими канатами.

winding I *n* 1. подъем; 2. выдача (угля) на поверхность; 3. обмотка; II *attr.* подъемный.

winding engine *phr.* 1. подъемная машина; 2. привод подъемной машины.

winding rope *phr.* подъемный канат.

wire-rope *phr.* проволочный канат.

wire-rope ladder *phr*. (подвесная) лестница из проволочного каната.

withstand *v* 1. сопротивляться; 2. выносить; выдерживать.

wood I *n* дерево, древесина; II *attr.* деревянный.

wooden *a* деревянный.

wrought iron *phr.* сварочное железо; ковкое мягкое железо.

X

x-bit *phr.* крестовая головка бура.

Y

y. *см.* **yard**

yard n ярд (=91,44 *см).*

Z

z-bit *phr.* зетообразная коронка или головка бура. **„z"-type drilling bit** *phr.* зетообразная коронка или головка бура.