FILE NAME: CERAMICS (CER)

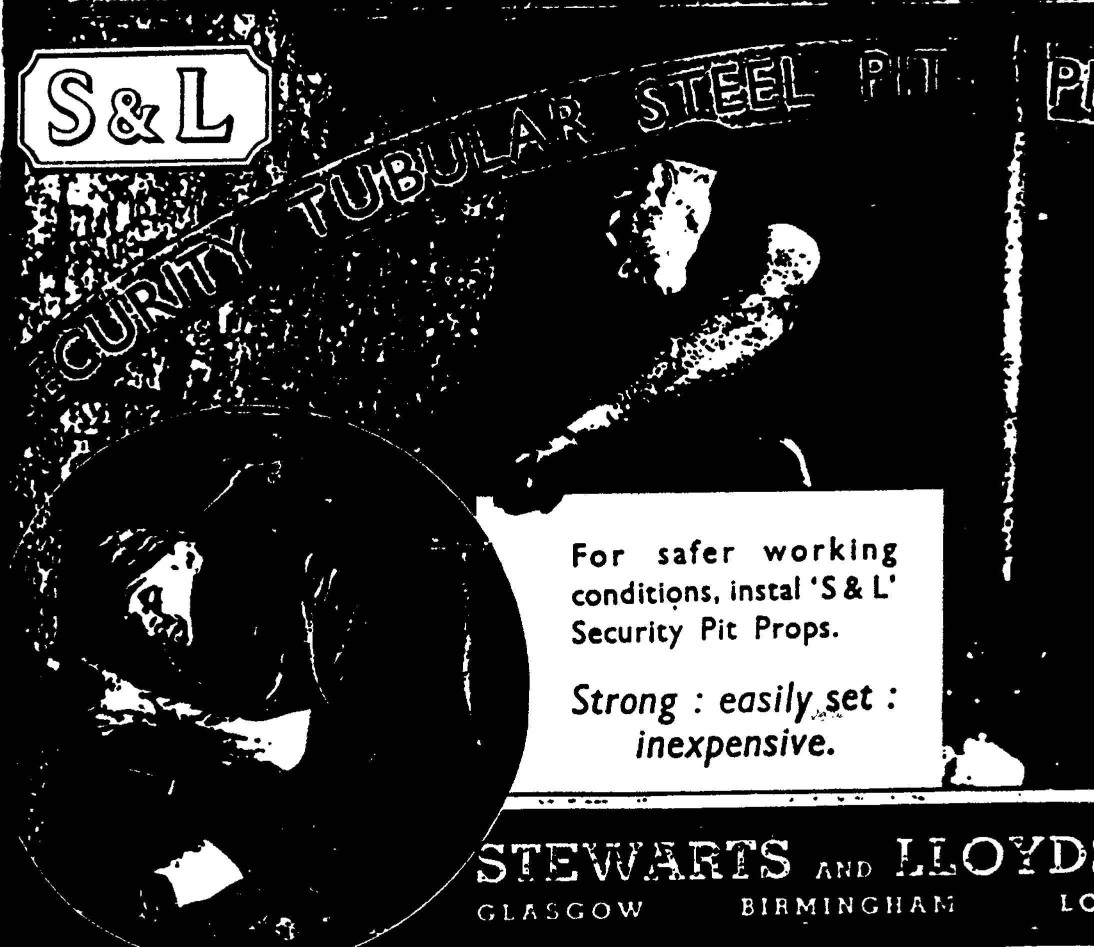
DATE: 1939 Sept

DOC#: CER020

DOCUMENT DESCRIPTION: Trade Journal Article - Fatalities from Silicosis ans Asbestosis - Their Incidence in Industry

IRON & COA

TRADES REVIEW



THE
IRON & COAL TRADES REVIEW
LONDON: SEPTEMBER 8, 1939

Iron-Ore Extraction in the Midlands*

OPEN CAST WORKING AND UNDERGROUND MINING

METHODS OF SURFACE WORKING

ALL ironstone in the Midlands was originally got by hand either at outcrops or not more than 15 to 20 ft. below the surface. The reinstatement of such land for agricultural use immediately after the working presented no difficulty. No great masses of subsoil had been disturbed; the topsoil was merely thrown on one side and then returned without any cost for haulage. At the turn of the century small steam excavators with a short-arm jib were introduced for the purpose of removing the overburden, but all land was still restored by hand. When a quarry was about to become too deep for restoration it was abandoned or mined. Excavators were then introduced for removing the ore itself. In the expansion of development due to the War, the American long jib and mechanical digger with a wide dumping radius was introduced. About this time some areas were first left unrestored. This was at first not so much due to technical difficulties as to a company going out of business.

The position became serious when, in the 'thirties, Stewarts and Lloyds left Scunthorpe

The appended description of iron-ore extraction in the Midlands has been taken from the Report* of the Committee on the Restoration of Land Affected by Iron Ore Working, and deals with methods of removing the overburden, and winning in underground workings

navvy following up behind dragline A and loading the ironstone into wagons B. The face at D gradually recedes as the ironstone is removed The working is like a movable cliff.

(2) A short jib excavator may be used in conjunction with a conveyor as in Fig. 2

The excavator A removes overburden from the face B and then empties the load into a small truck, or dumping tram, on the steel-framed conveyor at C. This runs up to the other end at D and tips over. The function of the conveyor is therefore to move the dumped overburden away as far as possible so that there is no danger of the navvy which is removing the ironstone becoming buried. The overburden is dumped by the conveyor in a ridge and furrow formation similar to that which results from the use of a long jib excavator but in a rather more wavy line.

The size of hill and dale varies also ... with the depth of overburden, since the ... the excavator used varies generally with ... depth of the overburden to be worked ... can therefore talk of a "normal" size o... and dale for a particular depth of overb... if it is understood that only a very gener... tionship is meant. The general tendency ... matter of importance in connection with ... costs of levelling When the cut is aban... a final gullet is left. This may be of the ... of 200 to 300 ft. wide and 60 ft deep, ... may form a considerable difficulty in se... access to the quarry, particularly for subse... restoration work.

Local Objections to Large Excavato...

It is the operation of these machines ... has alarmed local opinion and which has ... attention to the whole question of the ... working of ironstone in this country ... reaction to the coming of the largest exca... has been to suggest that they are not nece... It is seen that ironstone was won before ... machines came and it is suggested that ... ought, in view of the devastating conseq... to be a reversion to older methods or the ... covery of yet newer ones. If it is pointed o... reply that ironstone could not be got econ... ally at 60 ft depth by the old methods ... sometimes argued that, if the producers

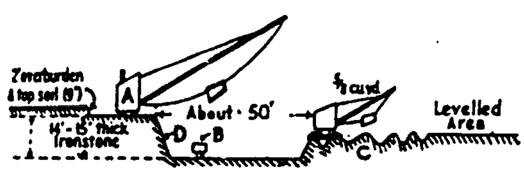


FIG. 1.—DRAG-LINE METHOD OF EXTRACTION.

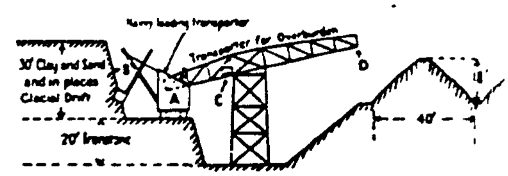


FIG. 2.—SHORT JIB EXTRACTOR AND TRANSPORTER

and came to Northants. Since they were latecomers they found all the areas of easily got ore controlled by other firms, and they were forced to lease areas of deep overburden. They began work on these with an electrical excavator which, with a 9 cub. yd. bucket (1 cub. yd. represents very approximately 1 ton), dumping radius of 102 ft., and a dumping height of 60 ft., could deal with overburden up to about 60 ft. in depth.

Ironstone is won by a number of different machines whose operations have somewhat different effects. They include the dragline which works on the principle of a rake; the excavator or "digger" with a short arm (the "jib") dumping on to a conveyor or wagons; the long-jib excavator which dispenses with the latter, and the Lubecker (land) dredger which can dump sand or other very light soil evenly. The dredger creates no problem of levelling because of the number of small bucket loads dumped, but for this reason it is only efficient in sand or light soil. There are a great number of combinations of these machines, with or without hand labour, which are used in different quarries, and it would be difficult to give a complete account of them. The following are descriptions of the work in three quarries which are representative of certain typical conditions.

(1) A 1½ cub. yd. dragline at A (Fig. 1) removes the 2-ft. overburden (including 9 in. of topsoil) and deposits it at C in a very shallow "hill and dale" formation which is then levelled by the ⅝th cub. yd. dragline at C. The operation is then completed by a 4-cub. yd. steam

(3) The overburden can be removed and dumped by a long-jib excavator. The sketches (Fig. 3) are of a 9-cub. yd. excavator at work. These machines are the largest in Europe, and they have an output of about 800 tons per hr. each. In fact the whole area assumes the aspect of having gigantic furrows, which are locally known as "hill and dale." The ridges consist predominantly of subsoil, and in them the topsoil is irretrievably lost. The size of these furrows depends on the size of the navvy used for the excavation. Where the largest navvies are in use, the distance from crest to crest is from 40 to 50 ft., the depth varying from 10 ft. to 16 ft., but where smaller excavators have been used in the past, the crest to crest distance is between 20 ft. and 30 ft., and the depth from 6 ft. to about 10 ft. The shape and size of the hills and dales depend not only on the type of machinery used for putting the material across, but also on the angle of repose of the dumped material. The natural angle of repose of any particular soil composition will generally only be found where it is free to trickle; e.g., on the slope of the dumped material stretching down to the quarry floor. Measurements are often made of this angle for different materials and combinations of materials, because it is this angle that determines the distance between the top of the dumped overburden and the face of the excavation. These measurements show that an average angle of repose is 1½ horizontally to 1 vertically, although it may be flatter in boulder clay where there is a good deal of slipping and steeper in limestone. The angle of actual hill and dale is nearly always flatter than the angle of repose proper because the material is partially spread as it is emptied from the excavator.

put to it, they could invent new methods ... would abolish or modify hill and dale Po... engineering developments as they appear to ... Committee from the evidence put before ... included:—

(1) An attempt might be made to improve ... excavator. The present performance of this ... function of the radius of the jib and of ... angle of repose of the dumped soil It is ... cause these two factors are fixed, that hill ... dale formation occurs. If the length of the ... could be varied slightly with each bucket ... then hill and dale of the present chara... would not be formed and a surface would ... which, if very irregular, would be much easi... level. If the length of the jib were increa... however, so as to give a choice of place... which each bucket could be emptied, the we... of the entire machine, which is already ... 800 tons, would be increased to an impractic... extent. Further, if any attempt were mad... dump material anywhere near the excavator ... angle of repose of the tipped soil would ... that the excavator itself would be buried.

(2) A new conveyor might be designed ... position of which could be altered between ... load placed on it by a small excavator ... witness suggested this, but the Committee ... it an unlikely development. The present ... veyors cannot be used where there is a de... of overburden of more than 40 ft. becaus... the strain which would be imposed upon ... arm of the conveyor when the truck was fart... away from its point of support. It would ... be easy, therefore, to design a conveyor wh... would produce better results with an overbur... of 60 ft. or more in depth than are given ... the present one with an overburden of 40 ft.

* H.M. Stationery Office, York House, Kingsway, London, W.C.2. (Price 2s. net.)

Fatalities from Silicosis and Asbestosis

THEIR INCIDENCE IN INDUSTRY

The problems associated with silicosis and asbestosis amongst industrial workers are receiving close attention. The former has tended to increase, and the latter, on balance, to decrease, in recent years

A SECTION of the Annual Report* of the Chief Inspector of Factories dealing with health refers to the question of dust and its effects, including silicosis and asbestosis. It is pointed out that for some years past, particulars of the total number of deaths from these two causes, which have been investigated by the Department, have been given and brought up to date. These figures have been specially useful from the practical point of view in aiding the installation of preventive measures of the necessary standard in processes exposed to risk. Of much importance and more general interest, however, is the trend of mortality rates from these diseases with or without tuberculosis, which does, when comparison is made after a number of years, reflect the effectiveness of the preventive measures installed. For this purpose, comparison of the figures of two successive years is of no value and sometimes misleading.

Table I shows deaths attributed to silicosis (with or without tuberculosis) during the last four years, together with the industries concerned. In factory cases, the cause of death has been borne out by departmental investigation. The variety of industries will be noted, and if space permitted to give in detail the precise occupational history in each case, the very widespread nature of the risk would be still more evident. For example, refractories' industries include amongst the 52 fatalities three whose occupation was that of repairing the silica brick linings of steel furnaces or converters, one a pot maker in a glass works, one an engine driver in a silica brick works, and one a grinder of refractory bricks, the remainder being associated with processes in the getting, crushing, grinding and manufacturing of refractory materials.

TABLE I.—*Deaths from Fibrosis of the Lung, including Silicosis and Asbestosis (England and Wales), 1935–38*

Disease and industry.	1935	1936	1937	1938
Silicosis :—				
Refractories industries	12	9	19	12
Pottery, manufacture of	56	47	64	48
Sandstone quarrying and dressing	40	43	19	27
Sandstone masons ..	61	68	74	58
Metal grinding .. .	28	24	12	25
Sand blasting	14	10	13	7
Steel dressing and cleaning of castings .	1	4	3	3
Stone, pebble, flint, and sand crushing ..	1	1	4	8
Scouring powders, manufacture of ..	1	2	—	1
Enamel and glass makers	—	1	—	—
Compo mixer (Tripoli)..	1	—	—	—
Abrasive-wheel manufacture	1	—	—	—
Millstone dressing ..	—	—	1	1
Slate dressing with sand	—	—	—	1
Electrician at steel foundry .. .	—	—	—	1
Slate quarrying and dressing	3	6	10	7
Granite quarrying and dressing	1	—	1	1
Tunnel mining (sewage works, etc.)	3	—	2	2
Grave diggers	1	—	—	—
Coal mining	111	120	137	177
Gold mining (South Africa)	16	4	16	12
Tin mining	26	24	20	20
Iron ore (haematite) mining	12	9	16	13
Lead mining	2	1	1	1
Copper mining	—	—	1	1
Barytes mining ..	2	1	1	2
Mining engineers ..	—	1	3	2
Total : silicosis ..	392	365	416	430
Asbestosis	16	11	13	9
Other cases of fibrosis ..	535	544	534	503
Grand total ..	942	920	963	942

The table also shows the fatalities from asbestosis and asbestosis with tuberculosis coming to the Inspector's knowledge and investigated during the years in question. The figures given under "Other Cases of Fibrosis" are the number of cases in which "Fibrosis of the Lungs" was entered on the death certificates as the primary cause of death, these figures being supplied by the courtesy of the Registrar General. It has not been possible to investigate all the deaths from fibrosis of the lung; but in the majority the occupation of the deceased appeared not to have involved risk from silica or asbestos, and it is well recognised that fibrosis may be due to causes other than the inhalation of dust. These returns are indispensable since, from time to time, they provide the starting point of further investigation which provides valuable information.

Silicosis and Asbestosis and Cancer of the Lung

In recent years the suggestion has been made in medical publications that there is some relationship between silicosis or asbestosis and cancer of the lung. The question is a difficult one, and the figures available are not yet large enough for it to be safe to draw conclusions from them. In exploring this question the field to be covered is wider than appears at first sight. Major points which will have to be settled are: Does silica or asbestos or the fibrosis of the lung they produce tend to inhibit cancer of the lung or to produce it? If the latter, do either of these two substances act as specific carcinogenic agents like tar, or is it that the disease they produce only prepares the soil for the occurrence of cancer? The following information has been collected from the Inspector's records. No case has been included in which a post-mortem examination has not been made.

Among 943 fatal cases in which silicosis or silicosis with tuberculosis was present, cancer of the lung was associated in 23 cases (2.4 per cent.). Of these 23, in 17 it was considered that the cancer was the primary cause of death, and in 6, silicosis or silicosis with tuberculosis. Among 347 deaths which were investigated during the same period owing to the possibility of silicosis being present, post-mortem examination revealed no silicosis but cancer of the lung was found in 17 cases (4.9 per cent.).

Similarly with asbestosis, among 103 fatal cases in which asbestosis or asbestosis with tuberculosis was present, cancer of the lung was associated in 12 cases (11.6 per cent.). Of these 12, in 6 it was considered that the cancer was the primary cause of death, and in 6, asbestosis or asbestosis with tuberculosis.

It is clear from these incomplete figures that extended inquiry and collection of data and evaluation of age incidence and age distribution are necessary before any conclusions can be arrived at.

The importance of the most careful post-mortem examination is emphasised by a recent case in which naked-eye examination revealed only advanced asbestosis, but what appeared to be a small blood clot in a bronchus turned out on microscopical examination to be a carcinoma, and also another case in which silicosis, tuberculosis and primary carcinoma were all present in the lungs.

Substitution of Siliceous by Non-Siliceous Materials

In processes in which the risk of silicosis is serious and uncontrollable or only partially controllable, the prevention of silicosis lies either in substitution by harmless materials or at the last resort in prohibition of the process. Efforts have been made therefore to find and introduce efficient substitutes for siliceous materials in certain processes. Progress has been made in this direction in the following processes—in some to a considerable extent, in others it is confined to technical experiments in the processes—(1) Alumina for flint in china bedding, (2) alumina for siliceous material in parting powders, (3) non-siliceous abrasives for sand or flint in blasting, (4) non-siliceous material for kieselguhr used in the slow cooling of steel, and (5) non-siliceous material for silica bricks for lining gas and other furnaces.

* H.M. Stationery Office, York House, Kingsway, London, W.C.2. (Price 2s. net.)

Hydraulic Stowing in India

(*Concluded from page 335.*)

livers sealing water to the suction gland of sand pump. Sealing water may be led from storage at the colliery itself when the river is in flood as the river water then contains an appreciable quantity of sand; but in dry periods of year, when a large basin has been excavated, clean sealing water is obtained direct from the river. The suction pipe is submerged and attached by a special flange to the pump [illegible] raised or lowered by a winch mounted on pontoon. By this arrangement flexible hose p[illegible] is not needed on the suction side, and [illegible] quantity of sand to water is regulated easily.

From the delivery side of the pump the sand and water mixture is conveyed by means of [illegible] armoured flexible hose pipe to a line of [illegible] steel pipes in 18-ft. to 20-ft. lengths fitted [illegible] Victaulic joints, the pipe range is carried [illegible] floats in the stream. The pipeline delivers [illegible] sand-water mixture into a conical separator [illegible] the rate of 8 tons per min. The sand-water mixture is fed on to screen plates with [illegible] holes; the velocity of the incoming mixture [illegible] so reduced that sand is deposited in the bo[illegible] of the separator and fairly clear water [illegible] through the shutes at the sides of the separ[illegible] The sand contains too much water hence [illegible] be delivered direct to the belt conveyor [illegible] the sand is further dewatered on a drying [illegible]

Sand-Drying Device

The sand-water mixture—by weight approximately 4 parts of sand to 1 of water—[illegible] from the bottom of the separator through [illegible] control valve over a distributing plate on to [illegible] 4 ft. wide drying belt. The drying belt con[illegible] of a series of shallow trays, 2 in. deep carried on rollers, each tray contains a mixture [illegible] graded slag which is kept in place by ½ in. [illegible] iron plates perforated with ⅛ in. holes. [illegible] belt is driven at a speed of 40 ft. per m[illegible] Three rollers or squeezers are placed equidistan[illegible] along the upper belt surface, and a series [illegible] prongs placed in series along the belt turn [illegible] sand over as it is carried forward. The rollers and prongs help in the dewatering of the sand whilst the slag in the trays allows water to pa[illegible] but not the sand.

The sand issuing from the drying belt contains by volume approximately 10 per cent [illegible] water. The sand is delivered from the end [illegible] the drying belt direct on to a 26-in. troughed belt conveyor which delivers it into the ma[illegible] bunker. The belt conveyor elevates the [illegible] 43 ft. in 130 ft. run to the top of the bunker on account of this grade only fairly dry sa[illegible] can be carried.

The sand is delivered by the belt conveyor [illegible] a specially constructed bunker holding approximately 1,000 tons. On the underside of [illegible] bunker runs the single rail around which [illegible] sand buckets of the aerial ropeway gravita[illegible] after being delivered from the rope. On each side there are 7 shutes which deliver sand [illegible] the buckets; the regulator at the bottom of [illegible] shute controlling the sand outflow to the buck[illegible] is of a simple type, and is kept in place by [illegible] balance weight. A one-ton capacity bucket [illegible] filled in 5 secs. through one of the shutes.

Luxemburg : Iron and Steel Output, Ju[illegible] 1939

Pig-iron output in Luxemburg in July total[illegible] 184,848 metric tons (183,565 tons in June last [illegible] 117,904 tons in July, 1938). Steel production [illegible] 177,649 tons in July, against 187,861 tons in J[illegible] and 110,293 tons in July, 1938. A total of [illegible] furnaces were in blast on July 31.