CEMENT & LIME MANUFACTURE

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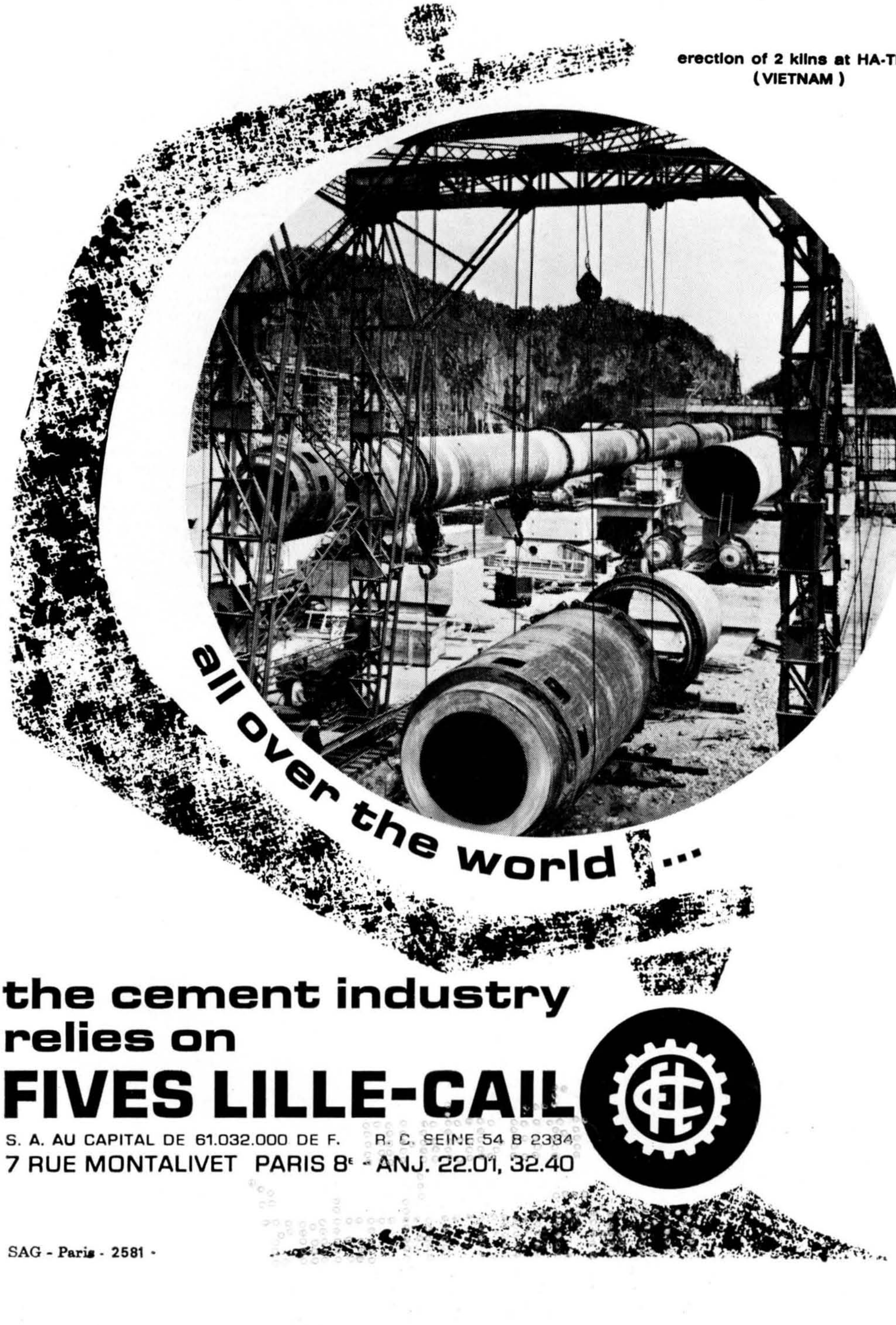
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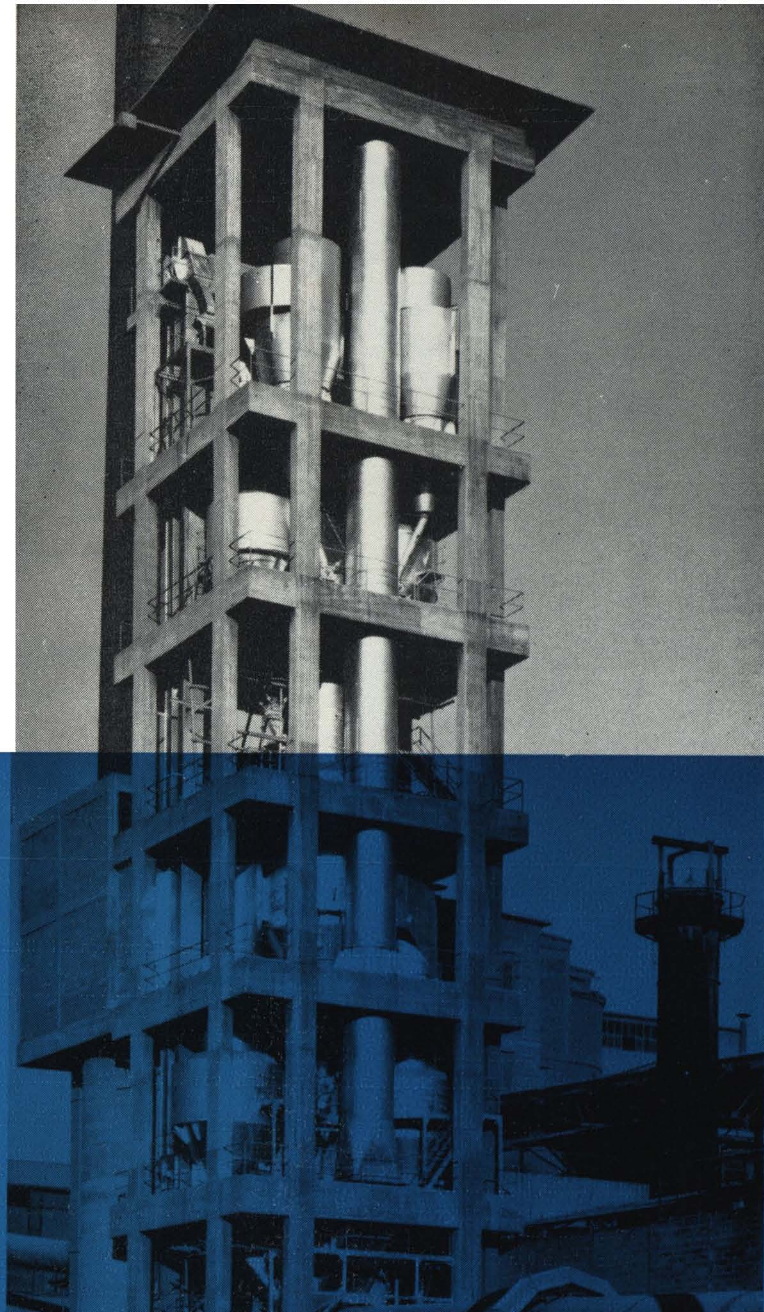

DOPOL kiln with raw material preheater

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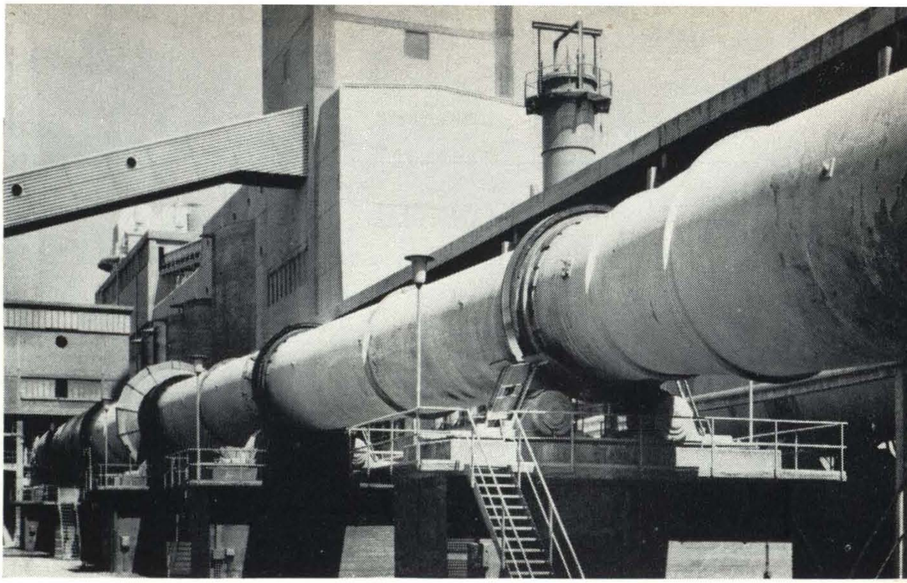
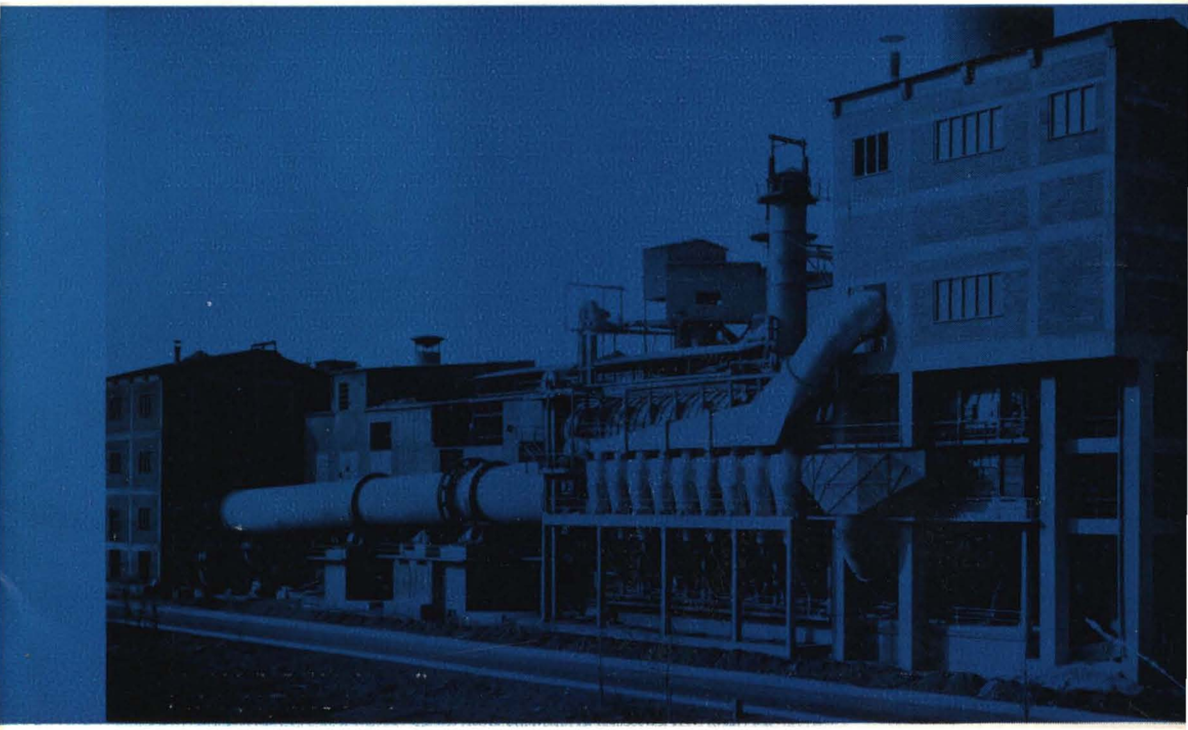


Long kiln for wet and dry process

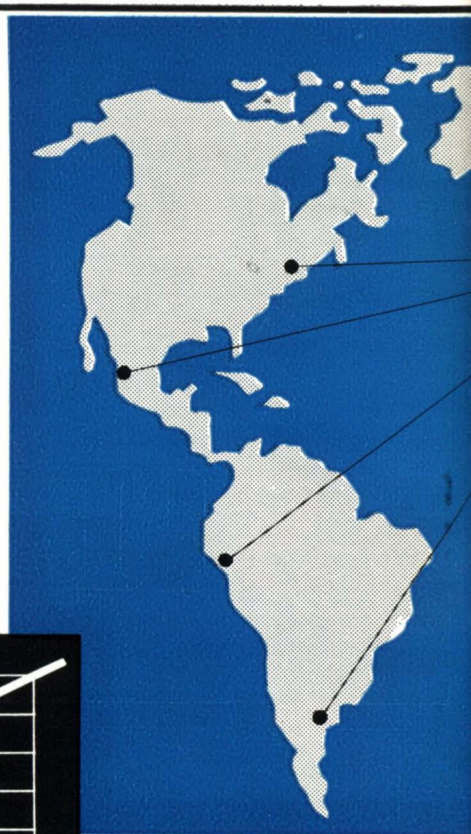
LEPOL kiln with preheater for granulated and small-size material

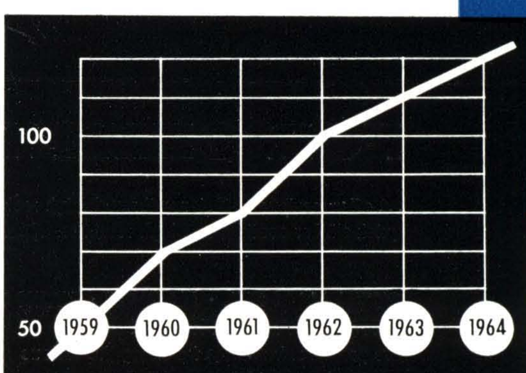


More than **140**

PREHEATER SYSTEMS

for Cement Production





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Cement Works in Spain.

THE cement industry in Spain is very active and in recent years there has been considerable expansion of the industry. At the beginning of 1960, the annual production of cement of around 5,250,000 tonnes was produced at some fifty works operated by about forty-four companies. The works are located in five principal groups, namely, in the south around Barcelona (nine works), Valencia (seven works), in the south-western corner (seven works), in the centre around Madrid (five works) and in the north (sixteen works). By 1963 the annual production had increased to more than 7,000,000 tonnes and, in 1964, exceeded 8,000,000 tonnes which was about one seventeenth of the total production in Europe (excluding the U.S.S.R. and satellite countries).

A feature of many of the cement works in Spain is the number of vertical kilns, old and modern, which have been and are being installed; in 1960 there were about thirty-five of such kilns (out of a total of some eighty kilns of all types) but today there are upwards of sixty.

The following are some examples of works the productive capacities of which have been increased during the past five years. The operating companies and the corresponding capacities for 1960 are given in brackets.

The following works operate entirely on the dry process with rotary kilns: Works near Barcelona at La Pobla de Lillet* and Moncada*, and at Villa Luenga de la Lillet, de la Sagra, Toledo (Asland): combined productive capacity 1,000,000 t. (514,000 t.). Works at Los Santos de Maimona*, Badajoz (Comercial Asland): 150,000 t. (75,000 t.). Works at Cordoba* (Asland Asociada S.A.) which are currently being extended (see this journal for November 1965): 150,000 t. (116,000 t.). Works at Torredonjimeno, Jaen (Cementos Alba): 250,000 t. (180,000 t.). Works at Yeles, Toledo (Espanola de Cemento Portland): 85,000 t. (54,000 t.). The recent (1965) expansion of the works of Cementos Molins is described subsequently in this article.

* See also page 4.

The following works operate entirely on the wet process (rotary kilns). Works at Moron de la Frontera, Seville (Soc. Andaluza de Cementos Portland): 360,000 t. (100,000 t.). Works in Santander at Mataporquera and Nueva Montana (Cemento Alfa): 305,000 t. (230,000 t.). Works at Denia, Alicante (Cementos del Mediterraneo): 53,000 t. (33,000 t.). Works at Morata de Jalon, Zaragoza (Cementos Portland Morato de Salon): 300,000 t. (164,000 t.). Works at Lemona, Vizcaya (Cementos Portland de Lemona): 300,000 t. (160,000 t.). Works at Sestao-Galindo, Vizcaya (Cementos Rezola-Viscaya): 150,000 t. (64,000 t.). Works at Castillejo, Toledo (Portland Iberia): 300,000 t. (135,000 t.). Works at Vicalvara, Madrid (Portland Valderrivas): 550,000 t. (300,000 t.). The present annual productive capacity of the works at Venta de Banos, Palencia (Cementos Hontoria), which was established in 1953, is 250,000 tonnes (150,000 t. in 1960) but this is to be increased to 600,000 tonnes.

The following works operate on the dry process and have vertical and rotary kilns. Works at San Justo Desvem, Barcelona (Auxiliar de la Construccion): 240,000 t. (165,000 t.). Works at La Cala del Moral, Malaya (Sociedad Financiera y Minera): 200,000 t. (125,000 t.). Works at San Vincente del Raspeig, Alicante, and Bunol, Valencia (Valenciana de Cementos Portland): combined productive capacity 720,000 t. (460,000 t.).

The following works operate on the dry process entirely with vertical kilns. Works at Arrona, Guipuzca (Cementos Alberdi): 120,000 t. (90,000 t.). Works at Sierra Elvira, Granada (Cementos Centeuro): 30,000 t. (12,000 t.). Works at Los Monjos, Barcelona (Cementos y Cales Freixa): 110,000 t. (54,000 t.). Works at Burjasot, Valencia (Cementos Turia): 300,000 t. (120,000 t.); the vertical kilns at these works are operated entirely automatically. Works at Galindo-Sestao, Vizcaya (Industries del Cemento): 75,000 t. (36,000 t.).

Cement Works at Sans Vincento.

One of the most considerable extensions is that of Cementos Molins S.A. at Sans Vincente dels Horts, near Barcelona, on the Mediterranean coast. Until recently this works, at which ordinary Portland cement and also some high-alumina cement is made, had two small kilns only. These kilns, which are each 50 m. (164 ft.) in length and of 2·5-m. (8 ft. 3 in.) and 2·0-m. (6 ft. 6 in.) diameter respectively, have now been augmented by the installation of a dry-process plant which has increased the daily productive capacity of 220 tonnes of Portland cement by 850 tonnes. In addition to the two original kilns, there are six alumina furnaces.

The new plant is a F. L. Smidth (of Copenhagen) installation and incorporates a Smidth pre-heater. The kiln is 106 m. (348 ft.) long and 4·15 m. (13 ft. 8 in.) in diameter. The raw material comprises limestone of some 85 to 95 per cent. carbonate content. It is quarried at a place some 10 kilometres (about 6 miles) from the works, and is transported to the works in motor lorries. Primary crushing is carried out at the quarry, and secondary crushing at the works prepares the limestone with the addition of clay. The crusher at the

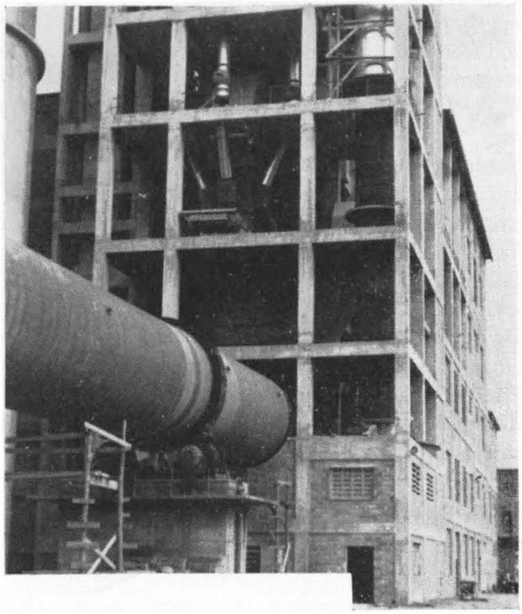


Fig. 1.
Preheater Building [redacted] at Cementos Molins [redacted] Works near Barcelona.

quarry is Hazemag equipment and the corresponding plant at the works is Miag equipment.

The preparation and pre-heating of the raw material is carried out in two stages, the material being passed through a flash-drier and also through ordinary drying equipment. The flash-drier comprises a vertical cylindrical shaft up which pass hot gases from the kiln. The raw material is fed into the ascending gas stream near the bottom of the shaft, the finer material being carried upwards in the stream, the coarser material falling to the bottom and thence being passed through a mill. The mill, which has a capacity of 60 tonnes per hour, is 6·60 m. (21 ft. 8 in.) long and 3·5 m. (11 ft. 6 in.) in diameter. The material from the flash-drier and from the mill can be passed through various circuits before being passed to the raw-material storage silos, while the gas passes through two electrostatic precipitators. The silos comprise two large structures of 14-m. (about 46 ft.) diameter and 20 m. (65 ft. 6 in.) high, one of which is surmounted by four smaller silos, each of 5 m. (16 ft. 5 in.) diameter and about 19·5 m. (64 ft.) high.

From the silos, the prepared material is transferred by means of a vertical bucket-elevator to the top of the pre-heater building (*Fig.* 1). The pre-heater comprises two stages, in the first of which there are three cyclones and in the second one cyclone. The raw material is heated up to about 700 deg. C, and then passed to the kiln.

The kiln is oil fired, the firing temperature being about 1400 deg. C. For most of its length, the kiln is exposed in the open air, but roofs are provided over the firing and feed zones and over the driving gear. The massive driving tyre weighs some 40 tonnes. The exhaust gases from the kiln are filtered first in a double-chamber electrostatic filter before being passed to the raw mill and flash-drier. The gases, together with excess gases, are passed through the electrostatic precipitators previously mentioned.

The clinker is ground in a ball mill which is 3·2 m. (10 ft. 6 in.) in diameter, has a capacity of 45 tonnes per hour, and is driven by a 1800-h.p. motor.

The material store, which has a capacity of 45,000 tonnes, is 16 m. (52 ft. 6 in.) wide and has a length of 250 m. (820 ft.).

The store structure and most of the other structures in the new installation, including some conveyor gantries and the shaft of the vertical bucket-elevator are mainly of reinforced concrete construction. The wall panels of concrete framed structures are generally of concrete blocks. The structures directly associated with the new installation were designed by Messrs F. L. Smidth, the remainder being designed by Cementos Molins S.A. The total number of personnel at this works is about 375, some ninety of which are engaged on the new installation. The washing and canteen facilities and other amenities and the housing provided by the Company are a feature of the establishment. The area of the land available at the works permits of future extensions.

British Interest in Spanish Cement Works.

The Blue Circle Group of Cement Companies announced that it is trebling its already sizeable investment in the Spanish cement industry with effect from January 1, 1966. In August 1964, the Group purchased a 40 per cent. interest in the new Spanish company, Asland Asociada S.A., of which the remaining shareholders are Compania General de Asfaltos y Portland Asland, a leading Spanish cement company (40 per cent.) and the Banco del Desarrollo Economico Espanol of Madrid (20 per cent.). This Company, with an ordinary share capital of approximately £1,800,000, purchased the existing Compania General de Asfaltos y Portland Asland works at Cordoba,† with a capacity of 150,000 tons per annum, and has constructed a new works adjacent to it, with an annual capacity of over 400,000 tons, making a total for the Cordoba project of approximately 550,000 tons per annum. The total value of the project is approximately £4,500,000. The new Cordoba works is expected to come into production within the first few weeks of 1966.

With effect from January 1, 1966, three of the remaining four works belonging to the Compania General de Asfaltos y Portland Asland Group were purchased by Asland Asociada S.A. These three works, at Pobla, Moncada and Santos de Maimona, have at present an annual capacity of approximately 450,000 tons,

† This works was inadvertently referred to as the "Cordoba Cement Co.", on page 113 of this journal for November 1965.

Fig. 2.
Map showing Location of Works in which a British Group of Companies have Interests.

which it is intended to expand by a further 150,000 tons. Asland Asociada S.A., is also in the final stages of detailed planning for an entirely new works in the Barcelona area, with a capacity of approximately 500,000 tons per annum, the cost of which may be in the order of £5,000,000. The location of the existing and proposed works are shown on the accompanying map (*Fig.* 2).

In order to finance the purchase of the three existing works, together with their modernisation, and the cost of the new works in the Barcelona area, the ordinary capital of Asland Asociada S.A., is being trebled with effect from January 1, 1966. In the case of The Associated Portland Cement Manufacturers Limited (the parent company of the Blue Circle Group), this means a further investment of approximately £1,600,000.

Asland Asociada S.A., plan to raise further finance in the form of medium and long-term bond issues and bank finance for the completion of the expansion plan, which when complete will result in a total productive capacity of approximately 1,600,000 tons per annum, making the Company the largest cement producer in Spain.

International Symposium on Lime.

AN International Symposium on Lime was held in Berlin in September 1965. The Symposium, which was attended by delegates from eighteen countries, was organised by Bundesverband der Deutschen Kalkindustrie e.V. The presentation of papers in Berlin was followed by a study tour of lime works in Western Germany. The following papers were presented at the Symposium.

"Underground Mining: inclined drilling, various blasting practices, loading with a pan feeder." By J. Pinto (U.S.A.).

"Modern Crushing Practices: portable crushers." By J. C. Macdonald (U.S.A.).

"Influences of Limestone Dressing on Grain Size and Shape." By K. Stumpf (Germany).

"Economical Use of Limestone Quarry Equipment." By B. Koster (Germany).

"Quality Control and Quality Supervision in Lime Plants." By Dr. Flachsenberg (Germany).

"The Mechanism of Limestone Calcination." By S. Traustel and W. Ulrich (Germany).

"Lime Quality Requirements and Development Trends in Lime-burning Techniques." By E. Schiele (Germany).

"Oil-fired Lime Shaft Kilns in Great Britain." By I. E. Kimberley and D. H. Anson (United Kingdom).

"Experience with Plasticized Binders in Sweden." By E. Holgberg (Sweden).

It is understood that the papers, including the subsequent discussions thereon, will be published shortly and will be obtainable from Bundesverband der Deutschen Kalkindustrie e.V., Kaiser-Wilhelm-Ring 26, Cologne, 5, Germany.

Simultaneous Production of Aluminium Oxide and Portland Cement.

IN Poland, a new method of obtaining aluminium oxide from clay low in alumina content, with the simultaneous production of Portland cement, has been devised and is in operation in that country on a commercial scale. The ratio of the production of aluminium oxide to cement is 1 : 10. From the point of view of the production of aluminium oxide, the advantages include the use of easily accessible and cheap deposits of clay; the prime cost of the Al_2O_3 product is analogous to that of other methods and even less when the additional production of cement is taken into consideration; and the high quality of the aluminium oxide obtained. As regards the production of cement, the advantages claimed are a considerable increase in the output of a rotary kiln by raising the production of cement clinker by 20 to 30 per cent., and the possibility of producing cements of high quality.

The Late Sir George Earle.

IT is with deep regret that we record the death, on December 11 last, of SIR GEORGE EARLE, C.B.E., the President of The Associated Portland Cement Manufacturers Ltd.

Cement and the First Thames Tunnel.

By A. J. FRANCIS.

IN 1824, a company was formed in London, with the active assistance of the Duke of Wellington, to put into effect a plan devised by the French-born engineer, Marc Isambard Brunel, for boring a tunnel under the River Thames between Rotherhithe and Wapping, a distance of about 1200 ft.

Construction began in 1825 on what was to become the world's first tunnel under a navigable river. It was finally completed in 1842, Brunel being knighted by Queen Victoria for this achievement. It has been said that the Thames Tunnel attracted more attention at home and abroad than any other event during the nineteenth century. It is of considerable importance in the history of cement being the earliest work in modern times in which cement was used on a comparatively large scale.

The Thames Tunnel was to be built entirely of brick and, during 1824, Brunel made many experiments to ascertain the best mortar or cement in which to lay them. Owing to the proximity of water and the constant danger of leakage and flooding, speed of setting was an essential condition and it did not take Brunel long to come to the conclusion that only Parker's Roman Cement would answer the purpose. In a letter, dated 28 April 1824, to the Directors of the Thames Tunnel Company he writes:

> It is advisable in my opinion to provide for the supply of Roman cement of the best quality that can be found, for which supply I recommend treating with Messrs. Francis and White, of Vauxhall.

However, Roman cement was expensive and the Directors were more interested in using the cheapest materials available. It was necessary for Brunel to write to them in July of that year as follows:

> But with respect to Roman cement of which I have collected a great many samples from various manufacturers, some will I find bear more sand than others, in which case a saving may be obtained, but as to comparison with any mortar, I have no hesitation in repeating that in the construction of the Tunnel we cannot introduce any other substance but Roman cement of the best quality.

The size and importance of the undertaking drew quotations from suppliers of cement throughout London and elsewhere, and Brunel received a steady supply of samples of every description. In September 1824, he reported that the cements supplied by Messrs. Turner & Montague and Messrs. Parker & Wyatt were also suitable for use in the Tunnel in addition to that supplied by Messrs. Francis & White. However, the Directors still insisted that some use should be made of cheaper supplies and, a year later, Brunel had to report in the following terms:

> It being indispensable that the Roman cement to be used in the formation of the Archways should be of that quality which can be depended on for immediate setting, I beg leave to state that the cement obtained from Mr. Wilkes, though good for the ordinary purpose of stuccoing and other works above ground, is not found to answer for the works of the Tunnel. I must object therefore to any more being used in the Company's work.

It was the practice to supply Roman cement in airtight casks each containing 5 bushels. The contents of each cask supplied for the Tunnel was tested before use and it is reported that about four-hundred tests of cement were made each week. The work of the bricklayers was closely supervised and if any brick was found to be loose after the cement had set, the bricklayer concerned was instantly dismissed.

A report from Brunel, dated 10 April 1827, contains an account of the accidental sinking by his workmen of Messrs. Francis & White's barge containing two-hundred casks of cement. Brunel makes the comment that he does not think any liability will rest with the Thames Tunnel Company. In early 1828, the Company's funds were exhausted and work on the Tunnel accordingly was stopped. About 600 ft. of tunnel had by then been completed. An interval of seven years now occurred before the necessary money was forthcoming to enable work to be resumed. During this period Brunel's inventive brain produced a number of interesting projects, the most important of which was the erection in the yard of the Tunnel at Rotherhithe of an experimental brick and cement arch without the aid of centering.

Work on the Tunnel re-commenced in 1835 and the Directors were again demanding economies in the use of cement. In April of that year Brunel reported:

> I beg leave to inclose a report made by the Resident Engineer to me of the result of experiments made on 6 casks of Mr. Keen's cement which it is concluded cannot answer for our works.

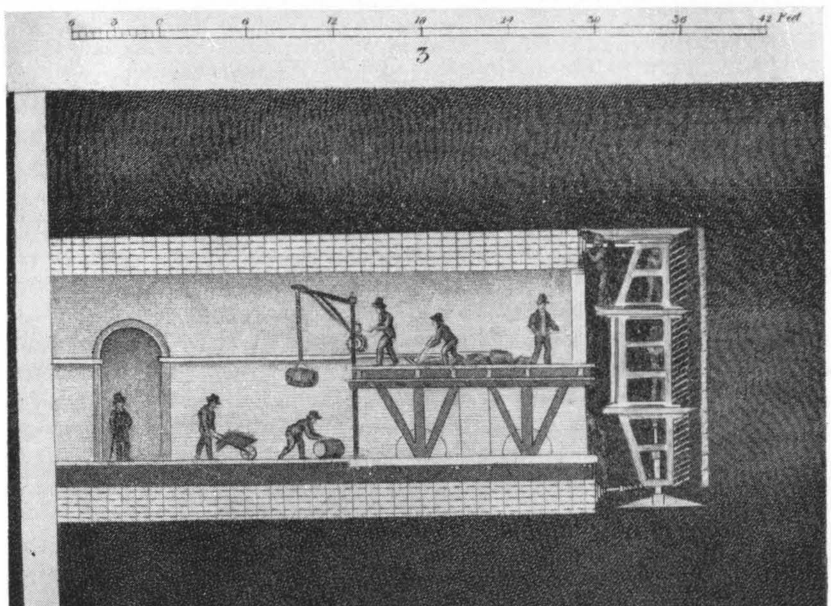


Fig. 1. Construction of the Thames Tunnel.

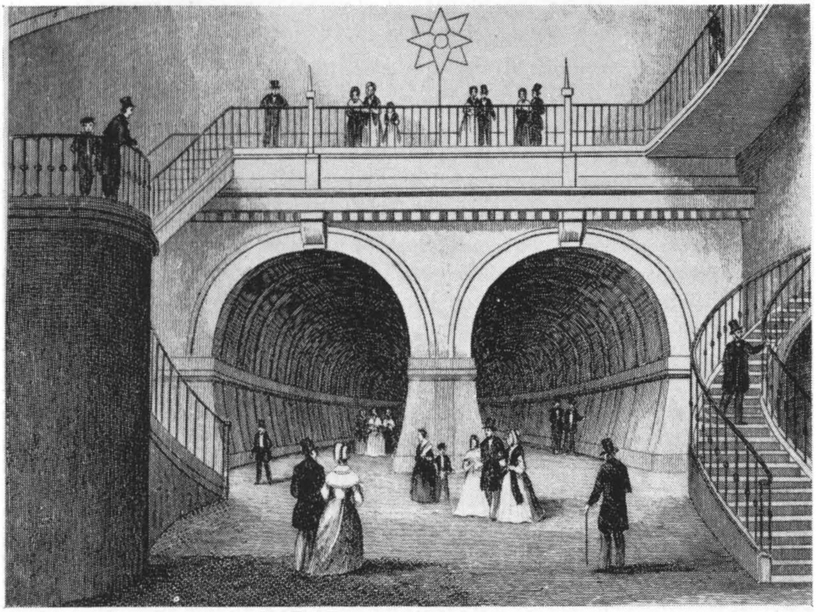


Fig. 2. Entrance to the Thames Tunnel.

In June he wrote:

As the quality of the Roman cement and our confidence in its properties are of the first moment in our proceedings I must, in addition to the proofs which the Board have had of the quality of that supplied by Messrs. Francis & White, beg to refer the Court for further confirmation to the result in the use I have made of it in the construction of the experimental arch where it is put to a very severe test.

It appears however that in 1837 the Directors had instructed Brunel to obtain further supplies from Messrs. Parker & Wyatt and in December of that year he wrote:

Regarding the order which I gave to obtain Roman cement from Francis & Sons I beg leave to state that on the 2nd of November, the day preceding the last irruption, Messrs. Wyatt & Parker were written to that some casks have been found to be of an inferior quality. Verbal complaints had previously been made and on one occasion when I was not satisfied I ordered 38 casks from Messrs. Francis which answered our purpose. In respect of the quality of Messrs. Francis' cement, I may say that it has not been excelled by any other and in confirmation I would refer you to the experiments made at Chatham under the direction of Col. Pasley of the Royal Engineers under competition with others. I also refer the Board to the experiments made by myself some of which have been carried beyond any precedent, as reported to the Institute of British Architects. These reports are independent of the evidence we have in the portion of the Tunnel now completed. Moreover, when application was made to several manufacturers to provide cement fit for the Tunnel, the quality of which was described to them, yet they failed to produce a cement fit for our purpose although the trials were made by their own Agents.

This is the last recorded communication by Brunel to the Directors of the Company on the subject of cement.

The Tunnel was completed and opened to the public as a thoroughfare on 25 March 1843. As an indication of public enthusiasm for Brunel's achievement, the following is quoted from an editorial in the 'Illustrated London News' for April of that year:

> Had not modern ingenuity extended the Wonders of the World to seventy times seven, the Thames Tunnel would long rank as the eighth Wonder, for this bold attempt to effect a communication between the shores of a wide and deep river without interruption to its navigation, has had and probably will have no parallel for many ages.

The accompanying illustrations, which are reproduced from contemporary prints, show the Tunnel in the course of construction (*Fig.* 1) and the entrance to the completed Tunnel (*Fig.* 2).

★ ★ ★ ★

It was claimed by William Aspdin that his father's Portland cement was used to fill the breach in the Tunnel which occurred in 1828 when the river broke in and flooded the works and caused some loss of life. This claim was made in some advertisements published while Aspdin was in partnership with Robins at Northfleet, and was repeated with considerable embellishment in a pamphlet issued by him in 1856 while in partnership with Ord at Gateshead. Its importance lies in the fact that it was accepted by nineteenth-century historians of cement and has ever since been cited as the first recorded use of Portland cement on a large scale.

It is now possible to verify the truth of Aspdin's claim without much difficulty. Brunel's diaries covering the years of construction of the Tunnel together with the Engineers' reports have been preserved and are now in the possession of the Institution of Civil Engineers. At the same time a detailed description by Henry Law of the construction of the Tunnel up to the cessation of work in 1828 has been published.

There were two major breaches of the Tunnel, the first occurring on 18 May 1827 and the second on 12 January 1828. Smaller breaches occurred in 1836 and again in 1837. Of the two major breaches, on 15 April 1828, Brunel wrote:

> There are numerous instances which are recorded in this journal in which cavities occurred in the Tunnel. The larger ones formed by irruptions of the river as on 18th May, 1827 and 12th Jan., 1828 we have filled up with clay bags and gravel together, the bags being struck through with hazel rods and the gravel being properly applied, the whole forming a mass which when exposed to the pressure of the water becomes compressed and impervious to water. There cannot be more conclusive evidence of the efficiency of this plan than the success which has attended the two cases mentioned.

For the eruption in 1828, it is stated that four-thousand bags of clay and several tons of gravel were used. By mid-April, the clay-bag plug was so firm that the tunnel could be pumped dry and on the 22 April, Brunel reported to the Directors as follows:

> The Court will find in the occurrences of the last few days a further confirmation of the efficacy of clay bags as a protection against sudden irruptions of the river, and with the results which have been obtained, no doubt ought to remain in your minds as to the preference to be given to clay bags compared with any expedient hitherto

suggested. Their efficacy cannot be questioned. Everything is going on very favourably and we cannot do better than by persevering in the ways which have found to answer so well in the past.

Brunel received some three hundred suggestions for filling the breach in the Tunnel in 1828, and these are carefully recorded in his diaries. As will be noted, none of them was adopted. There was no suggestion which mentioned the use of Portland cement.

There is at present no evidence to show that leading engineers and architects had ever heard of Portland cement prior to its manufacture by William Aspdin at Rotherhithe in 1843. To begin with, they viewed the new material with considerable mistrust and suspicion, and it made slow headway against the firmly established reputation of Roman cement. It is to the mid-nineteenth century that historians must look to find the first example of the substantial use of Portland cement.

[More information regarding the actual construction of the Thames Tunnel and the materials used and tests undertaken are given in "The Tunnel", by David Lampe. Published by Geo. Harrap & Co., Ltd., 1963.—ED.]

A Report on Dermatitis.

THE British Safety Council has published a new report entitled "Industrial Dermatitis: Causes and Prevention" and compiled by Dr. L. B. Bourne. It is intended for supervisors and employees handling substances known to have caused dermatitis and, it is claimed, for the first time five hundred of these causes are listed in one publication, although it is admitted that the list is incomplete. Frequently, delay of treatment prolongs dermatitis and the consequent cost to the industry in the United Kingdom is estimated to be £100,000,000 annually and to result in the 800,000 lost working days.

The symptoms of dermatitis are usually irritation and redness. As the disease progresses there may be swelling, blistering, discharge of fluid, cracking, crusting and flaking of the skin, and permanent redness or thickening. The author of the report makes it clear that dermatitis can be avoided in 99 per cent. of the cases by adopting sensible personal hygiene, and the use of barrier creams and protective clothing. The report lists the obligations of employers to give their staff maximum protection and these include efficient ventilation, the replacement of harmful materials, and the provision of protective clothing, barrier creams, adequate washing facilities, information, inspection and first aid. The employee's responsibility is to make sure he gets this protection, and adopts it conscientiously.

The report is most concise but, to be of greater value, it might have been more informative regarding specific industries and give data regarding the comparative risks and the measures employers are taking to combat or avoid the disease. Such information would make the list of material causes more instructive. For example, although cement powders are included in the list, the very successful efforts of cement manufacturers in the United Kingdom, and elsewhere, to combat and erradicate the disease in cement works could be noted.

Copies of this twelve-page report are obtainable from the British Safety Council, Mason House, 163 Praed St., London, W.2. (Price 1*s*. 6*d*. per copy).

Cements for Concreting in Cold Weather.

THE third edition of the technical report "Concreting in Cold Conditions", issued by The Cement Marketing Company, incorporates the lessons learned during the hard winter of 1962/63. The problems are clearly stated and advice is tendered so that the planning of works and the selection of materials can be directed towards minimising delays on the site. Precautions are suggested for varying degrees of severity of weather and the appropriate treatment of the cement, aggregates and water are described to suit such variables. Some notes on forecasting the weather are included and there is a useful temperature record chart.

The information given relating to appropriate cements is particularly comprehensive and includes a chart (reproduced in a modified form in *Fig.* 1) giving typical variations of the heats of hydration of four types. The observations on which the chart is based have been made using the method given in B.S.1370[1]. These results will not always relate to those obtained by using an adiabatic calorimeter.

Ordinary Portland cement, rapid-hardening Portland cement, and a proprietary type of extra-rapid hardening and quick-setting Portland cement, in that order have increasingly rapid release of heat of hydration. Since sulphate-resisting Portland cement gives up its heat more slowly than the other cements considered, it is most affected by cold conditions. If, as may frequently be the case, the dimensions of the member or block of concrete are substantial, the mass of concrete assists in retaining the heat evolved because concrete permits only the slow dissipation of contained heat. For slender members or under very cold conditions, it may be possible to use high-alumina cement, which is also sulphate resisting. Calcium chloride should not be used in sulphate-resisting concrete,

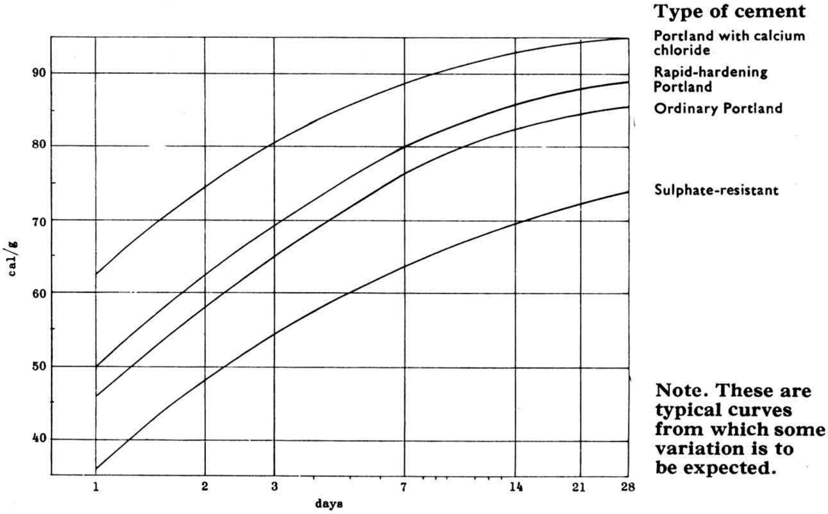


Fig. 1

because the sulphate resistance will probably be reduced(2) and, in reinforced concrete, there may be the risk of corrosion(3). At the time of placing, concrete must never be colder than 4 deg. C. (39 deg. F.)(4) and preferably not colder than 10 deg. C. (50 deg. F.) and not warmer than 30 deg. C. (86 deg. F.). Precautions which may be suitable whichever of the foregoing cements (except high-alumina) are used are given as: covering newly-placed concrete and leaving wooden formwork in position; increasing the cement content(2); using warmed aggregates and mixing water; or introducing steam or hot moist air under covers.

High-alumina cement concrete is only slightly affected by a fall in temperature, almost to freezing point, before setting and, provided simple precautions are taken, it is recommended for use under conditions well below freezing point.

Copies of the report and pads of the temperature-record chart are obtainable gratis from The Cement Marketing Company Ltd., Technical Department, Portland House, Stag Place, London, S.W.1, or from Messrs. G. &. T. Earle Ltd., Technical Department, Wilmington, Hull, or from any District Office of The Blue Circle Group.

REFERENCES

1.—B.S. 1370. "Low-heat Portland Cement." (British Standards Institution, London. 1958).

2.—"Recommended Practice for Winter Concreting." (ACI 604 : 56. American Concrete Institute. Detroit. 1950).

3.—BLENKINSOP, J. C. "The Effect on normal ⅜in. Reinforcement of adding Calcium Chloride to Dense and Porous Concrete." (Magazine of Concrete Research No. 43. C. & C.A., London. 1963).

4.—B.S. 1926. "Ready Mixed Concrete." (British Standards Institution, London. 1963).

Congress of Chemical Engineering.

THE Fourth Congress of the European Federation of Chemical Engineering is to be held in London in June of this year. The primary subject is to examine the interaction of technology and economic factors in relation to process plant. The Congress is to be held at the Olympia on the occasion of the International Chemical and Petroleum Engineering Exhibition, and will open on June 15 and close on June 24.

The technical programme will comprise the following: process development and evaluation; cost reduction in the design phase; cost control of projects; costs *v.* performance in equipment used in unit operations; control and improvement of plants in operation; and developments in the movement and storage of raw materials and products. Most of the time of each meeting will be devoted to discussion which will be simultaneously translated into the official languages of the Congress, namely English, French and German.

Although none of the papers proposed to be presented at the Congress deals specifically with the cement industry, a perusal of their content shows that there should be much to interest the cement manufacturer.

Registration forms for the Congress are obtainable from the Institution of Chemical Engineers, 16 Belgrave Square, London, S.W.1.

Transportation and Distribution of Cement.

SOME recent developments undertaken by various cement companies in Great Britain and abroad for distributing cement and similar products are described in the following.

Special Railway Vehicles.

Mention has been made previously in this journal of the special trains used solely for the transport of cement from the works to distributing depots or the sites of large constructional works. Appended are further examples of this practice.

The construction of the new Clywedog dam, near Llanidloes, Montgomeryshire, will require some 50,000 tons of cement which is to be carried by British Railways Western Region at the rate of 600 tons a week in special diesel-hauled trains of "Presflo" wagons running direct from the Aberthaw works, Glamorganshire, to Llanidloes. A special approach road has been built at the site of the dam for the delivery of the cement.

In order that deliveries of their special products shall be faster and more economical, The Associated Portland Cement Manufacturers Ltd., are obtaining ninety-six special enclosed wagons for use on British Railways. Sundry and special products made by the Blue Circle Group are manufactured in the Thames area, and hitherto, deliveries to the north have been by road, in ordinary railway goods trains, or by sea. Express trains, formed entirely of the new wagons will now be run, British Railways providing the diesel locomotives and the guards' vans and will go direct from the works to the distribution depots. The new vehicles (*Fig.* 1), which are being built by the Standard Railway Wagons Co., have an overall length of 30 ft. and carry 22 tons compared with 12 tons carried in a British Railways' standard wagon.

A train of twenty "Presflo" 20-ton wagons now runs on five days each week from the new works of The Associated Portland Cement Manufacturers Ltd., at Weardale, Co. Durham, to the Cement Marketing Co.'s depot at Heaton, Newcastle-upon-Tyne (see below). The loading plant on the private siding at the Weardale works, the first kiln of which went into production recently, is illustrated in *Fig.* 2.

Fig. 1.

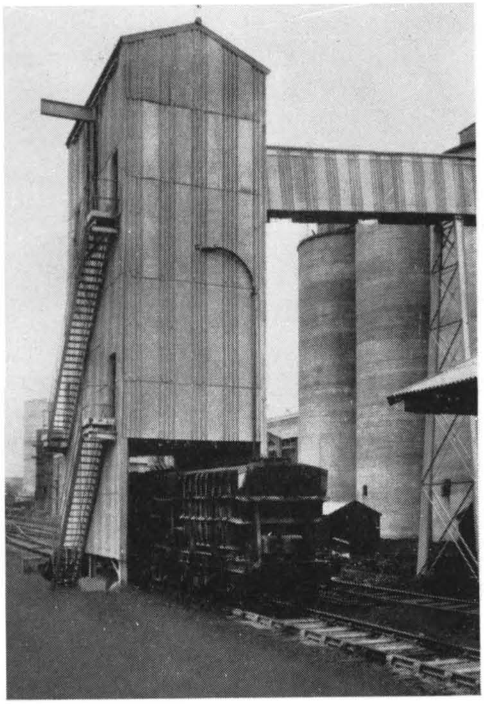


Fig. 2. Rail-wagon Loading Plant at Weardale Works.

British Railways also ran block trains of " Presflo " wagons to convey cement in 500-ton loads between the works at Pitstone, Bucks., (*Fig.* 3) of The Tunnel Portland Cement Co., Ltd., and that company's bulk storage and distribution depot at Kew Bridge. The cement was supplied mainly to the contractors engaged on the construction of the London end of Motorway M4. At Kew Bridge depot there are two 230-ton silos (*Fig.* 4). Each of the two trains running between Kew Bridge and Pitstone comprised twenty-five wagons.

Distribution Depots.

Elevated silos, constructed of precast concrete rings and with steel hopper bottoms, erected by the Blue Circle Group of Companies at distributing depots at Leeds and Manchester, were described and illustrated in this journal for November 1964. Each of the Leeds silos has a capacity of 180 tons and the Manchester silos 250 tons. Two similar silos of 250 tons capacity have also been installed on a railway siding at a cement distributing depot at Northam, Southampton.

A distribution depot covering 2½ acres and with a storage capacity of 1,500 tons was opened in March last at Heaton, Newcastle-upon-Tyne, by the same Group. The equipment included six silos, each 63 ft. high, and a bag-packing plant in addition to an office building, canteen, stores, workshops, a weighbridge, storage

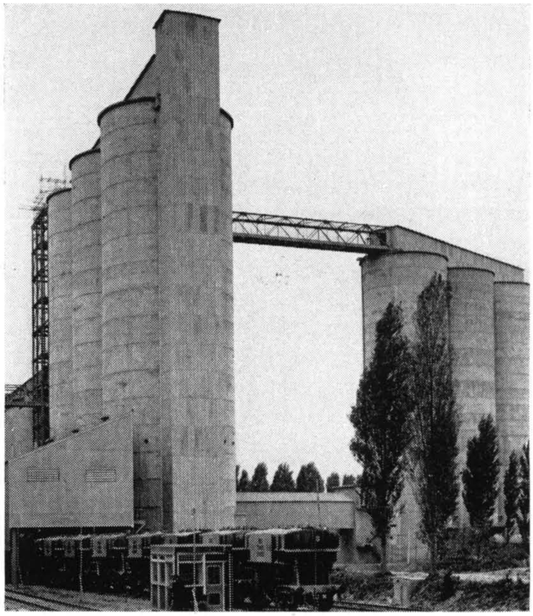


Fig. 3. Loading Plant at Pitstone Works.

tanks for diesel oil, and a railway siding. The cement is delivered in bulk to the depot by rail in 20-ton "Presflo" wagons owned by the Group. Twenty-five of these wagons can be stored on the siding, and two electrically-operated capstans are used to shunt the wagons to the unloading area. The cement is discharged into the silos by rotary air-compressors at a rate of 80 tons an hour.

Fig. 4. Distribution Depot at Kew Bridge.

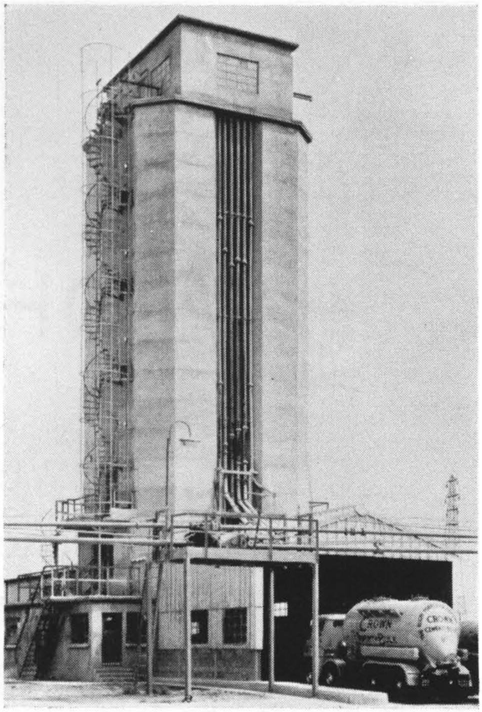


Fig. 5. Bulk-loading Plant at Rochester Works.

At the Rochester works, Kent, of The Rugby Portland Cement Co., Ltd., an automatic loading plant for bulk transporters has been installed (*Fig.* 5). Working on a 24-hour basis, the plant is particularly busy in the early hours of the day as many contractors need cement to be delivered at the start of the working day. The plant comprises four silos each of which contains 250 tons of a different grade of cement. Below the silos, which are fed by pipeline direct from the works, are two weighbridges, 32 ft. long, each of which has a capacity of 30 tons. When a bulk transporter drives on to the weighbridge, a card is printed giving the tare weight of the vehicle. The weighbridge attendant sends an electrical signal to the operator of the silo valves to inform him from which of the four silos the transporter is to be loaded. Once the signal has been sent, the other three silos are automatically blocked to prevent the possibility of the wrong cement being loaded. The lorry driver then attaches a flexible trunk to the transporter ready for filling. Meanwhile the weighbridge attendant has set the indicator on the weighing machine to deliver the required gross weight (that is, the tare weight of vehicle plus the weight of cement). When the correct weight has been delivered the valve automatically closes, this operation being controlled by an electronic switch fitted to the scale. It takes about 8 minutes to fill either an 8-ton or a 15-ton

**Fig. 6.
Silo at
Distribution
Depot at
Inverness.**

road tanker, since there is the problem of evacuating air from the vehicle during loading. The cement is fluidised with air to ease the flow.

On completion of loading, the weighbridge attendant operates the printing unit which records the gross weight of the transporter. As well as printing the card, the machine also prints on a tape to produce a permanent record of the operation. The plant can dispense from 200 to 250 tons of cement per hour with both weighbridges in operation.

The weighing equipment and control gear were supplied by Messrs. Henry Pooley & Son Ltd. The design and construction of the silos were undertaken by Messrs. Kier Ltd.

A reinforced concrete silo of 1,800-tons capacity has been installed at each of the distribution depots of the Blue Circle Group at Grangemouth, Inverness,

**Fig. 7.
Dual-purpose
Tanker.**

Dundee and Aberdeen. The illustration in *Fig.* 6 shows the silo at the Inverness depot. The silos were designed for The Associated Portland Cement Manufacturers Ltd., by Messrs. Oscar Faber & Partners.

Two-purpose Road Tankers.

One of the problems arising in the transportation of cement by road, namely to find a useful load for returning vehicles, has been solved by the Swedish Kockum Company, Interconsult, of Malmö. For the transport of cement and similar powdered materials and liquids, a "Combi-tank" vehicle (*Fig.* 7), having a capacity of 22 tons, has been constructed and incorporates two cylindrical and two spherical tanks. On the outward journey the spherical tanks would be loaded with 22 cu. metres of cement, and on the return journey the cylindrical tanks would contain 26 cu. m. of oil or other similar commodity. The weight of the vehicle is 8 tons.

Cement Industry Abroad.

Sweden.—A major automation scheme is being carried out at the Limhamn cement works of Skanska Cementaktiebolaget, near Malmö. This is the largest cement works in Sweden. Various instruments, operating in conjunction with a computer, will provide on-line control of the production plant and raw-material preparation plant. At the production plant, a control panel, desk, and instrumentation for five wet-process kilns and the clinker-handling plant will be installed. Kiln variables to be controlled will be measured and converted into signals acceptable to the computer and recording instruments. Output-controlling signals from the computer will be fed to the various regulating devices by means of pneumatic converters and digital auto/manual stations. The quarry and blending plant are over 1 mile from the works and control panels, desk, and computer input and output instrumentation are to be installed. Slurry is to be transported from the blending plant to the kilns by a system of underground conveyors. The instrumentation is being supplied by Messrs. George Kent Ltd., to International Systems Control Ltd., which firm is carrying out the automation scheme.

India.—A cement works is to be established at Dala, in Mirzapur district. The Government is believed to have accepted the tender of a French firm for the supply of the equipment. The works, which is planned to produce 500,000 tonnes of cement annually, is expected to be in production by 1967/68. Lime deposits in Mirzapur district will be used and a master plan for developing the township of Dala is ready for implementation.

Poland.—A new plant is being added to the Chelm cement works in the district of Lublin. When the new works comes into operation in 1968, it is claimed that the Chelm region will become the largest cement-manufacturing area not only in Poland but throughout Europe. The cement industry in the Lublin region has been developed continuously since the 1950's, when the second works at Rejowiec was built; the first works at Rejowiec was built before World War II.

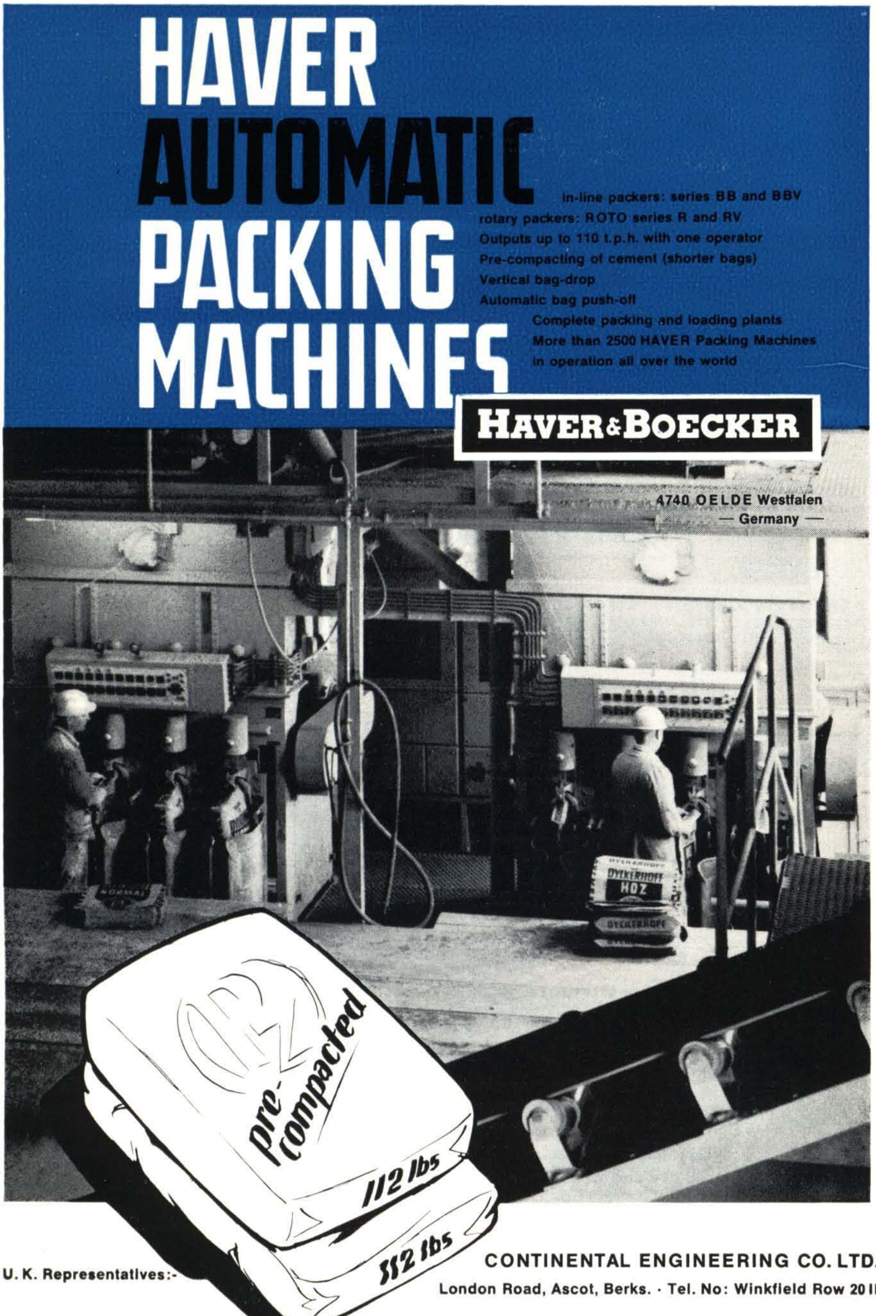
Tema Cement Works, Ghana.

As a result of these developments it is now possible to produce 2,000,000 tons of cement annually in this region; this is twenty times the pre-war production. New kilns are being added to the six now operating in the first works at Chelm. The three kilns being installed at the new works at Chelm will together supply more than the eight kilns of the older works, while employing a smaller staff. Productive capacity will rise to 3,000,000 tons annually.

Ghana.—The first cement works in Ghana is at the port of Tema and is now in production with a rated capacity of 200,000 tons a year. The Tema works is under the technical management of the Blue Circle Group which is also responsible for the supply of clinker for a number of years. In the foreground of the accompanying illustration of the works is seen the raw material and clinker store. The cladding for the buildings is of aluminium sheeting supplied by The British Aluminium Co., Ltd. The contractors for the works were Parkinson Howard, working in collaboration with The Associated Portland Cement Manufacturers Ltd.

Bahrain.—It has been announced in Bahrain that a National Cement Company is to be established which will be granted a monopoly by the Bahrain Government to import cement into Bahrain. This move, which has been agreed upon by the Bahrain Government in conjunction with the Bahrain Chamber of Commerce, is designed to stabilise the price of cement in Bahrain which has recently increased considerably, bringing about a rise in local building costs. The period of the monopoly to be enjoyed by the new Company has not as yet been decided and by the terms of its concession the Company will be limited to a profit margin on each shipment of cement imported into Bahrain of between 6 and 8 per cent.; the amount is to be decided later. The profit margin is expected to give the Company an overall return on capital sufficient to make it attractive to Bahraini investors. In addition to stabilising the price of cement in Bahrain, the new Company will have sufficient capital to compete in the purchasing market with other Gulf interests.

The National Cement Company will have an authorised share capital of 300,000 Bahrain dinars (£225,000) divided into 30,000 shares of 10 Bahrain dinars each. The maximum shareholding of any individual will be 400 shares and the minimum 3 shares. Directors of the Company should have a minimum holding of 200 shares.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