CEMENT
& LIME MANUFACTURE

VOL. XL. No. 6 NOVEMBER, 1967

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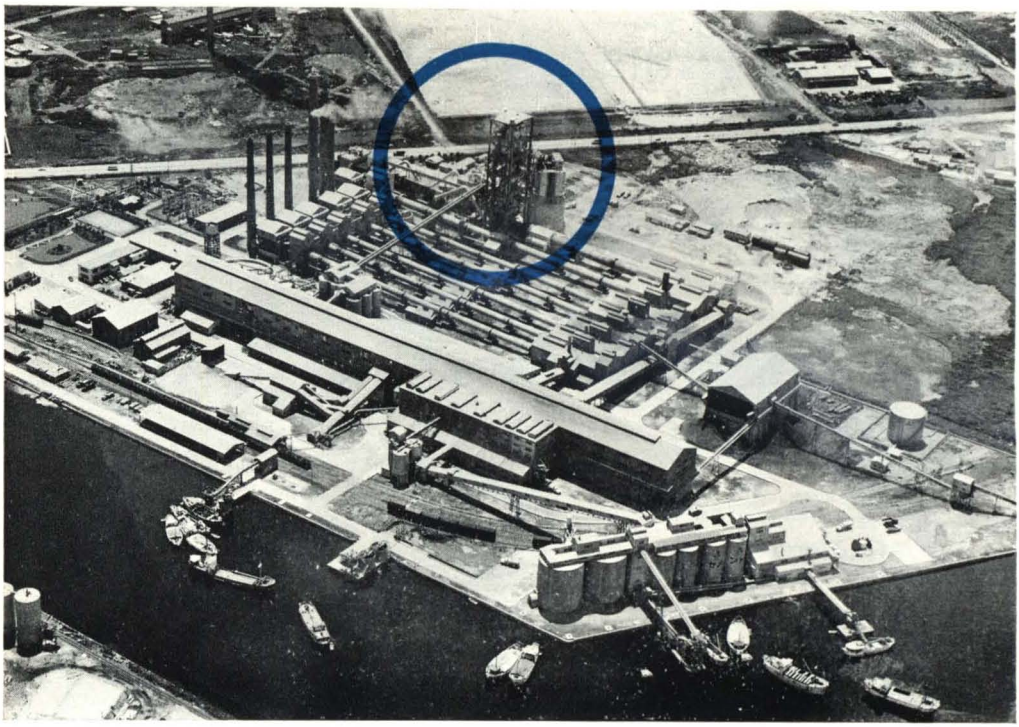
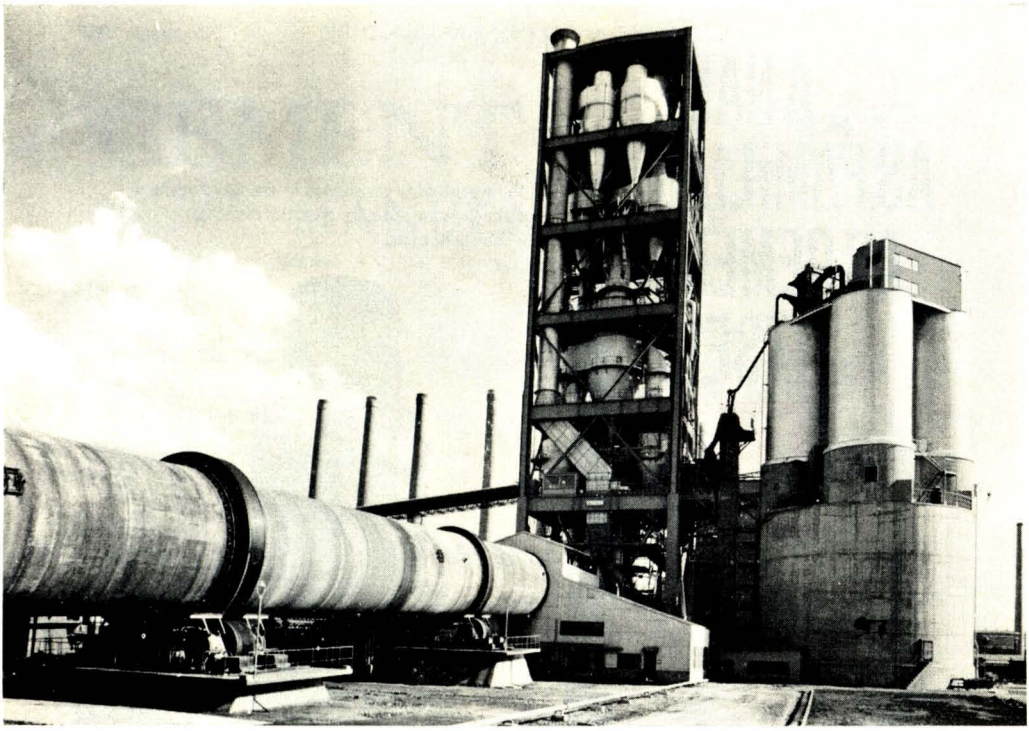


Here stood an almost new wet process kiln of 17′/16′/17′-6″ diameter, 615′ length, with an output of 1800 tons/day (with the high heat consumption associated with that system).
Greater kiln efficiency was required and the works engineers investigated the conversion of this kiln to the dry method.
There were two possibilities:-

1.) a long dry-process kiln with internal fittings. Guaranteed output: 2200 tons/day at 850 kcal/kg of clinker.

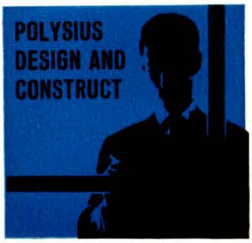
2.) a Polysius Dopol preheater with the existing rotary kiln shortened from 615' to 310' (the remaining length of the kiln to be used as a rotary dryer). Guaranteed output: 2500 tons/day.



The decision:

Dopol preheater kiln!

Output actually achieved:
2800 tons/day monthly average,
heat consumption 770 kcal/kg of clinker.



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Cement Mills of 3,000 h.p.

A NEW series of cement mills of 3,000 h.p. has recently been designed by The Associated Portland Cement Manufacturers Ltd., to meet the need, both in the reconstruction of existing works and in the establishment of new works, for units of greater size than their previous largest "standard" mill of 1,200 h.p. The following is a description of these larger mills, six of which are in the course of being installed at various works of the Blue Circle Group

Hitherto both ordinary and rapid-hardening Portland cements have been ground throughout the Group's works in open-circuit compound mills of up to 1,200 h.p., as at the works at Westbury, Dunbar and Weardale, descriptions of which have been given in previous numbers of this journal. For the new 3,000-h.p. mills, however, the closed-circuit system is adopted, mainly because of the difficulty of cooling large open-circuit compound mills which have a low ratio of shell-surface to mill-volume.

A flow diagram of the plant is shown in *Fig.* 1 (page 82). The main units are a Vickers mill with two chambers and two Heyd classifiers. Air used for cooling the mill is cleaned in a Dalamatic filter with a separate ancillary section for dealing with the general plant dust-collection system. The capacity of the equipment is 72 tons per hour of ordinary Portland cement with a specific surface of 3,200 sq. cm. per gramme or 40 tons per hour of rapid-hardening Portland cement having a specific surface of 4,350 sq. cm. per gramme.

Feeding and Mill-control Equipment

The clinker and gypsum are extracted from the respective silos by extractors and weighers controlled to give constant feed and proportioning. The equipment employed is not the same at all the works. Two examples are Richardson extractor-weighers in conjunction with a belt-conveyor (as was described in this journal for May, 1966), and Locker weighers in conjunction with vibratory conveyors.

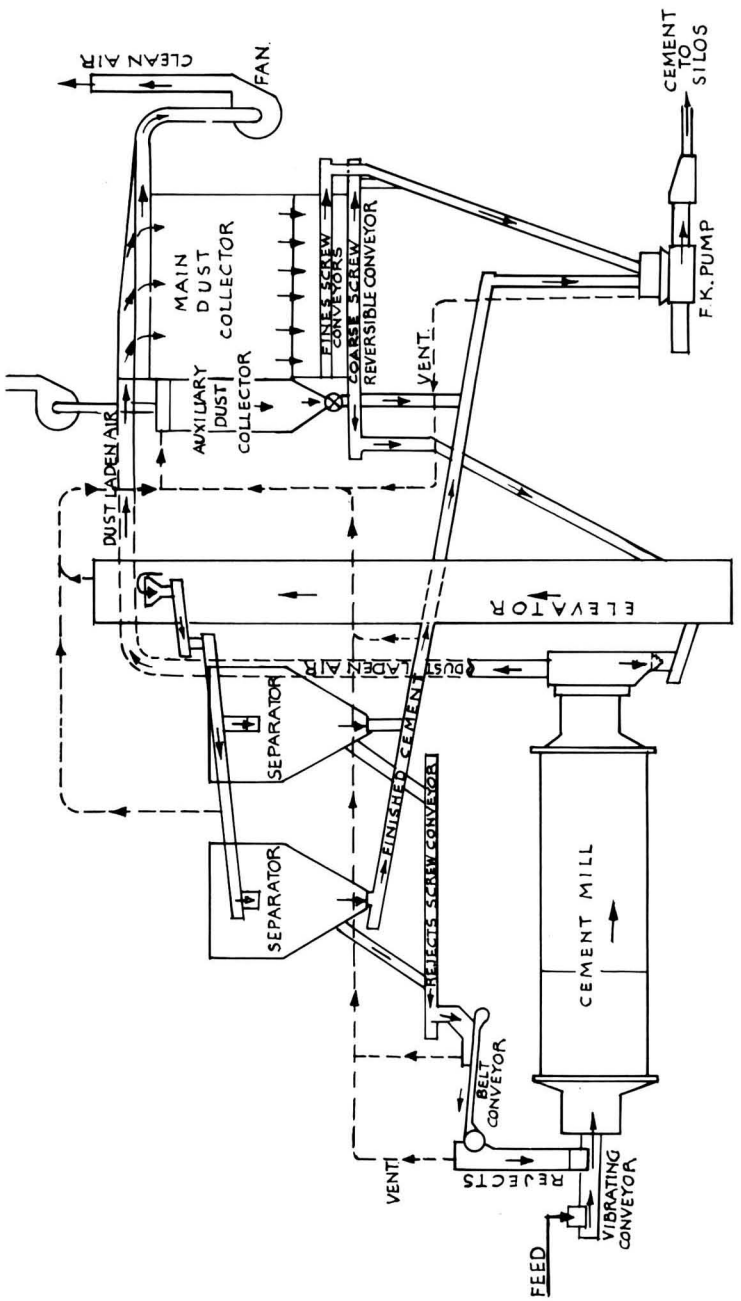

Fig. 1—Flow Diagram.

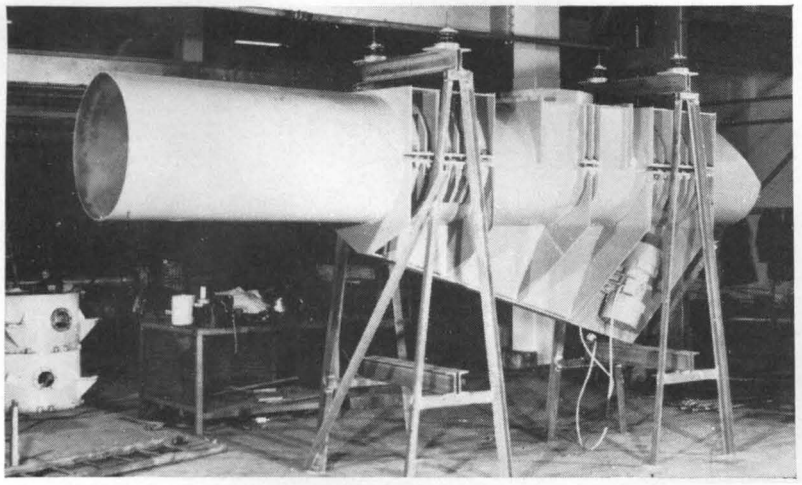

Fig. 2.

The total feed to the mill consists of the fresh material extracted by these systems at 72 tons per hour in addition to the recirculated material rejected by the separators up to a maximum of 144 tons per hour.

This material is discharged into the mill trunnion by a Locker vibrating conveyor, 24 in. in diameter and 15 ft. long (*Fig.* 2). The whole system is controlled from a central cabin in which there is a mimic diagram and electrical controls which are interlocked for stage sequence. The panel is shown in *Fig.* 3. In addition

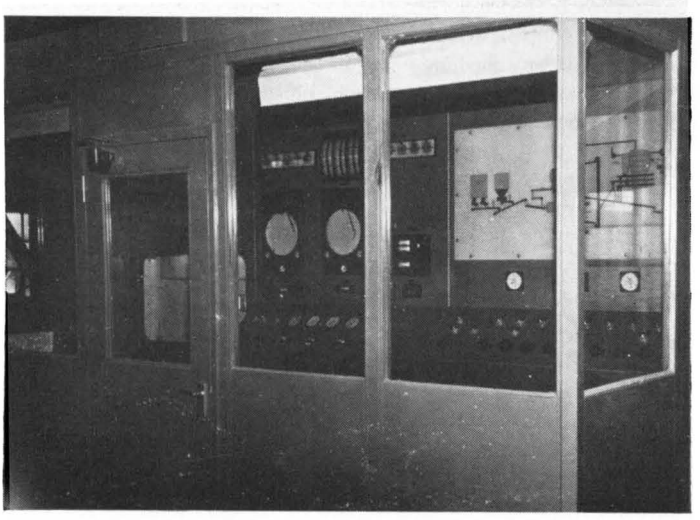

Fig. 3.

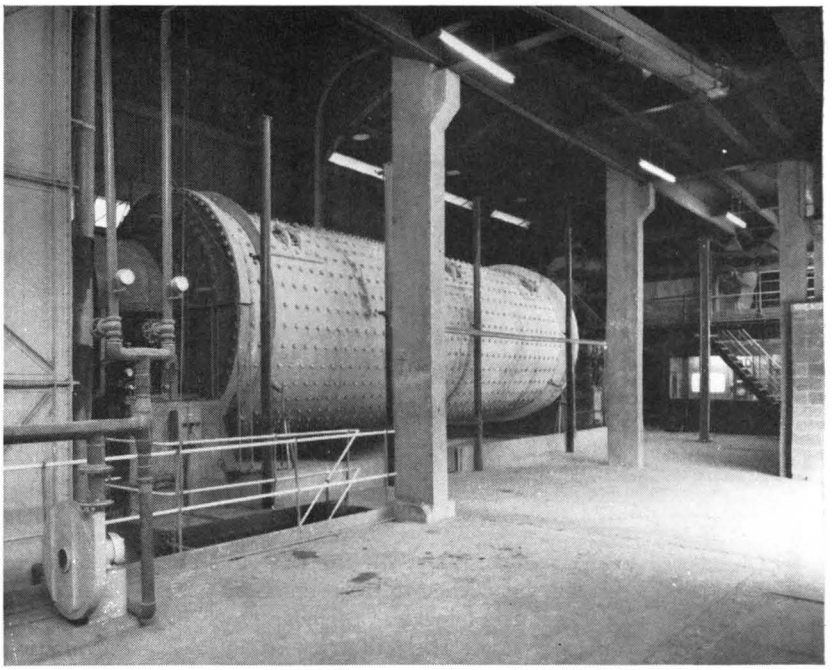

Fig. 4.

to the Honeywell controls for weighing and proportioning the feed, the mill is equipped with Davey & United sonic controls, and the elevator is equipped with a KW-load control, which between them can override the fresh-feed weighing control should any flushing occur in the system.

At the extreme left of the panel illustrated in *Fig.* 3, there is a twenty-pen recorder which has been developed by A.P.C.M., with flow-sheet instruments. The chart is 39 in. wide and has ten separate bands upon each of which two pens record two related functions (such as temperature and air flow) for the major controls required. This system has the great advantage that, since all the information is on a single chart, time is saved in chart renewal and scrutiny. It also overcomes the confusion so often encountered when several instruments make a number of records in different colours superimposed on a narrow chart.

The Mill

The mill, which is manufactured by Vickers-Armstrong, has an internal diameter of 3·8 m. and is 11·4 m. long. The ends are of high-quality cast steel and of one-piece construction with trunnions supported in bearings. The bearings are provided with jacking pumps, oil spray and integral oiling rings. The total charge of grinding media is 170 tons.

Fig. 5.

The mill (*Fig.* 4) rotates at 15·6 r.p.m., and contains two compartments, the first being 3 m. long with stepped liners and the second being 7·5 m. long with classifying liners (*Fig.* 5). Each ring of liners in the second compartment forms a truncated cone, which gives to this compartment the classifying properties of a conical mill shell while maintaining the diameter of the shell constant. The liner plates, which comply with the appropriate D.I.N. specification, are made of Bradley & Foster BF-253 material and are secured to the shell by means of a single-bolt fixing. The intermediate and outlet diaphragms are of the lifter radial segmental type and are also made of BF-253 material.

The shell is provided with splash rings so that, should additional cooling be found to be necessary, sprays may be installed to cool the outside of the shell with water.

The Mill Drive

The mill is centrally driven by an extension sleeve connected to the outlet trunnion and is encased by the mill outlet hood. The mill product is discharged through six holes in the sleeve, and delivered by an " Air-Slide " to the boot of the elevator. Banks of permanent magnets are incorporated in the " Air-Slide " in order to trap any broken media and metal slivers. The sleeve is connected through a torsion shaft and flexible couplings to an A.E.I. double-helical double-reduction divided-type gear-box driven by an A.E.I. auto-synchronous 11,000-V. motor running at 750 r.p.m. A view of the gear being assembled in the maker's works is shown in *Fig.* 6.

Classifying System

The ground material discharged from the mill outlet is elevated by a 65 ft. central-discharge bucket-elevator, and fed by " Air-Slide " conveyors to two Heyd air-separators 5 m. in diameter. Material that has not been comminuted to the required size is segregated in the separator and returned to the mill feeder by a 24-in. screw-conveyor. In the separator, a sectional view of which is shown in *Fig.* 7, the cut can be adjusted while running, simply by altering the speed of rotation of the distributor plate and vanes, which are driven by a

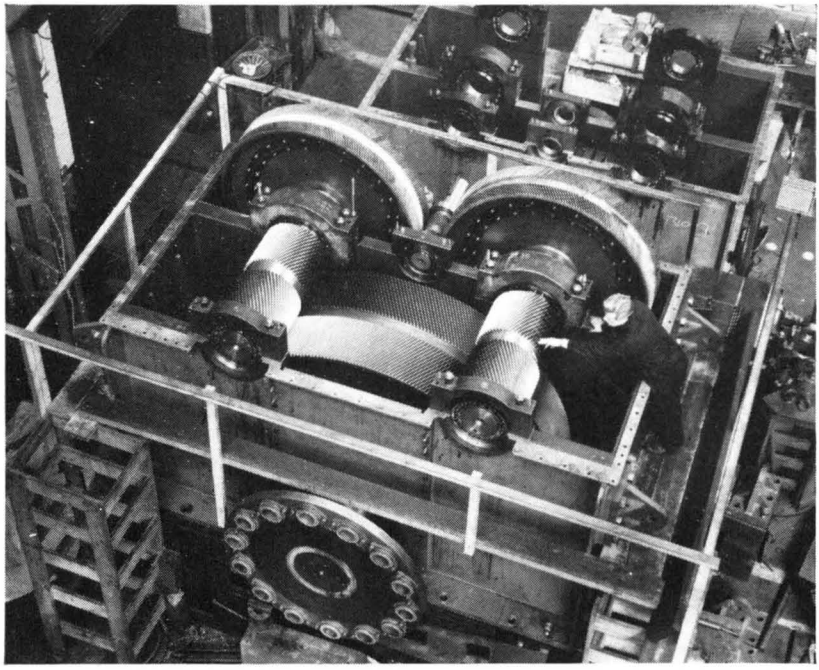

Fig. 6.

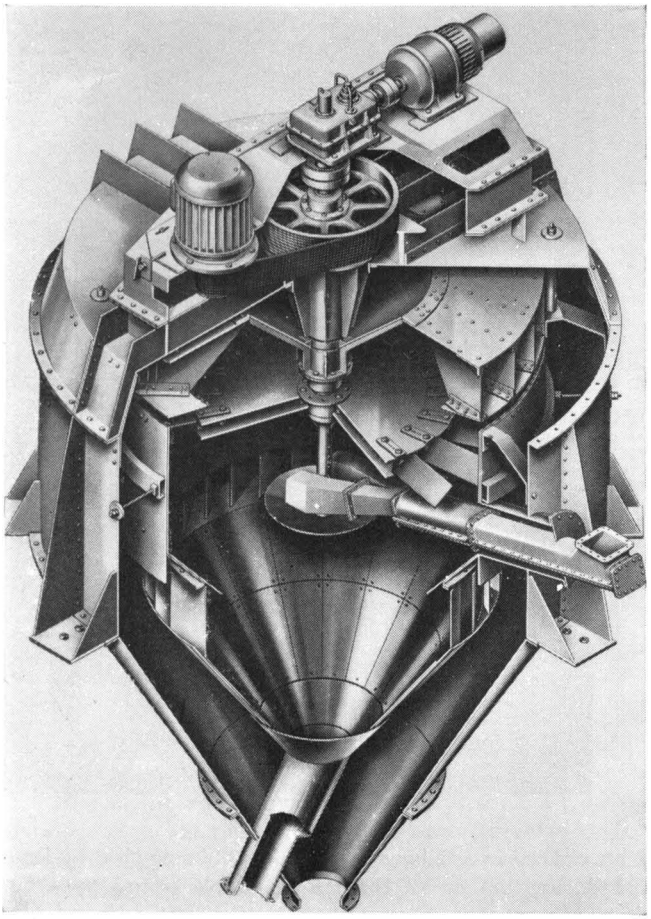

Fig. 7.

Lawrence-Scott variable-speed motor. This enables the quality of the product to be controlled. The elevator and screw conveyor, both of which were supplied by Barry, Henry & Cooke Ltd., are driven by squirrel-cage motors with fluid couplings. The finished product is conveyed from the fines outlets of the separators by " Air-Slide " conveyors to a Fuller-Kinyon pump which delivers it to the cement storage silos.

Mill-cooling and Dust-collection System

The cooling and dust-collecting system is designed for a stream of air of 37,000 cu. ft. at 80 deg. C. to be drawn through the mill for cooling and removal of reek.

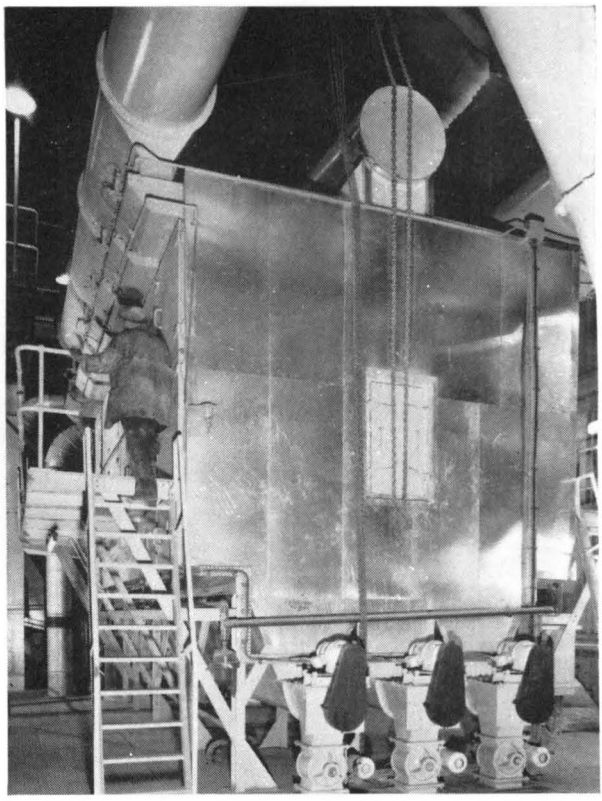

Fig. 8.

The air and reek are cleaned in a Dalamatic automatic filter supplied by Dust Control Equipment Ltd., and are drawn through the whole system by a fan located on the clean side of the filter to deal effectively with a dust burden of up to 110 grains per cu. ft. at N.T.P., which constitutes a heavy duty for filtering. The standard Dalamatic filter has therefore been modified to deal with this. The assembly consists of twelve banks of two-tier Dalamatic units arranged on two sides of an expansion chamber to scalp off coarse material (*Fig.* 8). Each tier comprises ten filtration elements (*Fig.* 9) having a total area of 4,800 sq. ft. of felted Terylene material capable of withstanding a maximum temperature of 120 deg. C. The filtration velocity is about 8 ft. per minute. The arrangement of the elements is shown in *Fig.* 10, which is a view of a single-tier filter in the maker's works. Each element is a flat rectangular box, one edge being open, the filtering material forming the two flat sides. The flow of air is from the outside to the inside of the box. The elements are supported vertically by the open edge in a plate separating the dirty side from the clean side of the

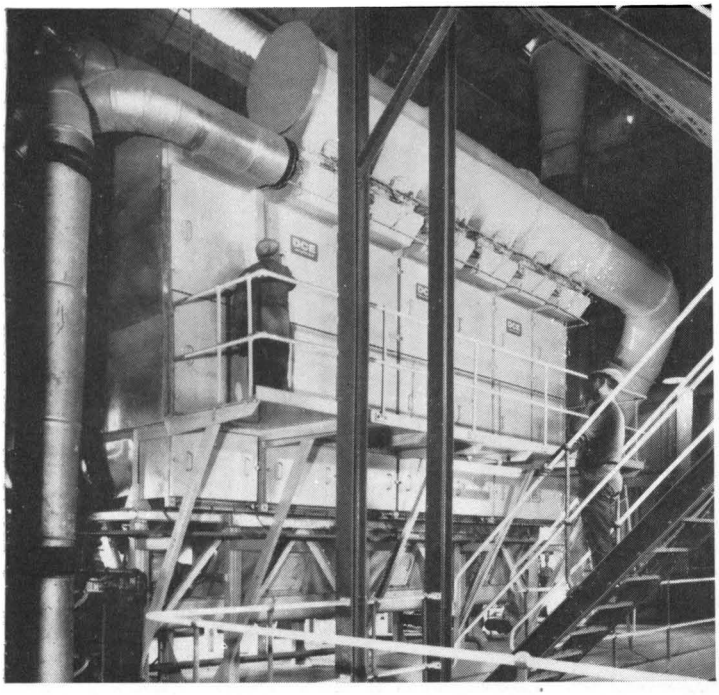

Fig. 9.

filter. Immediately in front of the opening, the frame around which is in the form of a venturi, a sparge pipe with nozzles facing the opening is mounted vertically. For cleaning the fabric, compressed air at a pressure of 100 lb. per sq. in. is admitted at intervals to the pipe by a solenoid-operated valve at its base. The resulting flow from the jets induces a reverse flow of clean air through the element, which is sufficient to dislodge accumulations from the dirty side of the element without rapping or shaking.

The solenoids are controlled from a panel outside the filter, the frequency and duration of the discharge being adjustable to give the condition most suitable for each installation. The ratio of cold compressed air to the hot air being filtered is so small that the cooling effect is negligible. This avoids the costly operation of heating scavenging air as has been found necessary with filters using a reverse flow of outside air induced by the fan in the system. The solenoid valves, which are the only mechanisms inside the filter, are easily accessible through the access doors in the casing. Any element can be removed separately from the assembly through the access doors as seen in *Fig.* 9.

There are three hoppers with conveyor-screws (*Fig.* 8) below the filter. The screws in two outer hoppers deliver the fine material to the Fuller-Kinyon pump. The screw in the central hopper is reversible and can deliver the coarser material

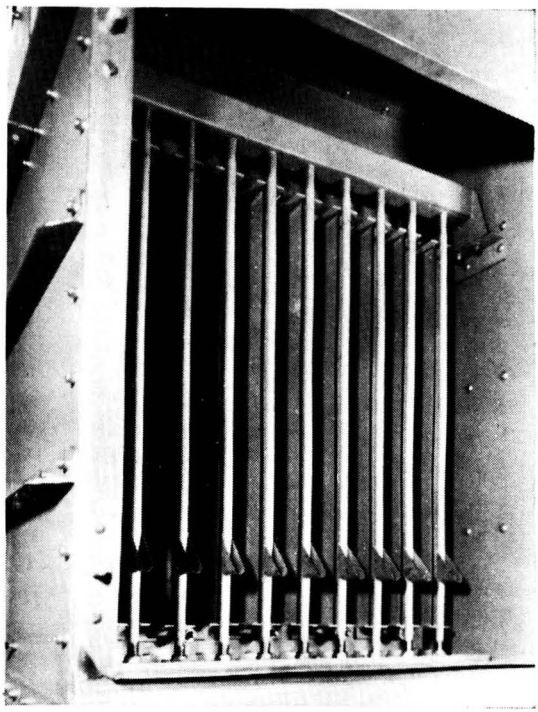

Fig. 10.

from the settling chamber either to the pump, when it is sufficiently fine, or to the boot of the circulating elevator if further reduction is necessary. The whole of the Dalamatic unit, the ducting and hoppers are lagged and protected with aluminium sheeting.

Auxiliary Dust Collector

For collecting dust arising from the various points exhausted in the feeding and conveying system, a standard Dalamatic filter unit, which is seen on the extreme left-hand side of the illustration in *Fig.* 9, is provided. This has the same profile as that of the main dust collector but it is an entirely separate system having its own fan. The dust caught therein falls through a rotary valve into the " Air-Slide " at the Fuller-Kinyon pump.

The filter consists of two banks of two-tier Dalamatic filter units each containing ten elements, giving a filter area of 800 sq. ft. The rated capacity is 9,000 cu. ft. of air per minute resulting in a filtration velocity of about 11 ft. per minute.

The plant shown in *Figs.* 8 and 9 are at the works of The Associated Portland Cement Manufacturers Ltd., at Ipswich.

Recommendations for Testing Cement

IN the number of this journal for last month, extracts were given from the Draft Recommendations for "The Testing of Cement" prepared by the International Organisation for Standardisation, which were published recently by Cembureau. The publication, which is divided into three main sections—definitions and terminology, strength testing, and chemical analysis—is obtainable, in English and French, from Cembureau, The European Cement Association, 2 Rue St. Charles, Paris 15e, France. Further extracts are given in the following.

Chemical Analysis : Main Constituents *(continued)*

Total Lime (CaO).—The procedure is as follows.

The filtrate from the hydroxides is evaporated to a volume of about 300 ml. and made just acid with HCl. Add 2 g. oxalic acid crystallized to 2 H_2O; bring to the boil and neutralise while still boiling with ammonia diluted 1/4 until the solution is coloured yellow (pH 4 to 5). Then allow the precipitate to settle keeping the solution hot for about 15 min. Filter with a medium filter and wash with a solution of ammonium oxalate (1 g. per l.) as cold as possible. Carefully remove the filter-paper with its precipitate from the funnel and place in the beaker in which the first precipitation was carried out. Dissolve in 50 ml. 1/4 hydrochloric acid. After digestion dilute to 200 ml. and add a few drops of methly red and 20 ml. of ammonium oxalate solution (50 g. per l.) or 1 g. oxalid acid crystallized to 2 H_2O. Heat to boiling point and precipitate the calcium oxalate towards 70 to 80 deg. C. by neutralising the solution stirring carefully with ammonia 1/4 added drop by drop until the appearance of the yellow colour of the indicator. Allow to stand for 1 to 2 hours, filter with a medium filter and wash with the ammonium oxalate solution (1 g. per l.). Burn off the filter-paper with its precipitate in a weighed platinum crucible and ignite 20 min. at a minimum of 1,100 deg. C. to obtain a more stable CaO. Cool in a desiccator preferably containing granules of lime calcined at a lower temperature (900 deg. C.) and freshly dehydrated silica gel or magnesium perchlorate ($CaCl_2$ is unsuitable). The weighing of a single crucible placed in a desiccator 20 cm. in diameter is possible after 5 min. Re-ignite until the weight is constant.

The result obtained is multiplied by 100 and calculated to the nearest 0·1 per cent.

Magnesia (MgO).—The principle of the test and some causes of errors are described. The procedure is as follows.

The original filtrates from the lime separation are gathered and slowly acidified with dilute hydrochloric acid and evaporated to a volume of about 400 ml. To the hot solution add 20 ml. of saturated diammonium hydrogen phosphate solution and about 50 ml. of concentrated ammonia (d = 0·910). At the same time cool the solution under a stream of cold water down to ambient temperature and mix the solution, using a stirrer for 20 to 30 min. Allow to settle for another 30 min. and filter on a medium filter-paper. The precipitate is washed thoroughly with cold water containing 2·5 per cent. ammonia.

Burn off the filter-paper separately in a porcelain crucible with the addition of one or two drops of concentrated nitric acid, add the precipitate to ignite at 1,000 deg. C. for 20 min. Weigh: the result obtained is the weight of magnesium pyrophosphate (MgP_2O_7). The transformation factor for Mg is 36·23. The result is calculated to the nearest 0·1 per cent.

Iron Oxide (Fe_2O_3).—The preparation of the various reagents, that is, stannous-chloride solution, barium diphenylamine sulphonate indicator, standard potassium dichromate solution and saturated solution of mercuric chloride, are described in the publication. The procedure is then as follows.

To 1 g. of sample add 40 ml. of cold water and while stirring the mixture vigorously add 10 ml. of HCl (d = 1·19). If necessary heat the solution and break up the cement with the flattened tip of a glass rod until it is certain that all the cement is completely decomposed. Heat the solution to boiling and treat with $SnCl_2$ solution adding this drop by drop with swirling until the solution becomes colourless.

Add a drop in excess and cool the solution to room temperature. Rinse down the interior of the beaker with water and add, all at one time, 10 ml. of saturated $HgCl_2$ solution. Mix vigorously for 1 min. and add 10 ml. of 1/1 H_3PO_4 and two drops of barium diphenylamine sulphonate indicator. Add sufficient water so that the volume after titration is between 75 ml. and 100 ml. Titrate with the standard $K_2Cr_2O_7$ solution. The end-point is taken at the point where one drop causes an intense purple colour which remains unchanged by further addition of standard $K_2Cr_2O_7$ solution.

The percentage of Fe_2O_3 is calculated from $100EV$, where E is the equivalent strength of $K_2Cr_2O_7$ solution (in grammes per ml. of Fe_2O_3), and V is the volume (in ml.) of $K_2Cr_2O_7$ solution required by 1 g. of the sample of cement.

Aluminium Oxide (Al_2O_3).—This oxide is determined by the difference between the total oxides (R_2O_3) and iron oxides, corrections being made for any notable amounts of TiO_2, V_2O_5, Cr_2O_3 and P_2O_5 present.

Sulphuric Anhydride (SO_3).—The procedure is as follows.

To 1 g. of cement add 25 ml. of cold water and while stirring vigorously add 5 ml. of concentrated HCl. If necessary, heat the solution and break up the cement with the flattened end of a glass rod until decomposition is complete. Dilute the solution to 50 ml. and heat it at just below boiling point for 15 min. Filter on a medium filter and wash the residue thoroughly with hot water. Dilute the solution to 250 ml. and boil. Add 10 ml. of hot $BaCl_2$ solution (100 g. per l.) dropwise from a pipette and boil until the precipitate is properly formed. Let the solution stand at just below boiling point for 12 to 24 hours.

Ensure that the volume of the solution remains between 225 and 260 ml. adding water if necessary. Filter the precipitate on a slow filter, wash it and place the filter-paper and its contents in a weighed platinum or porcelain crucible. Heat slowly and burn off the filter-paper without it flaming. Ignite at 800 or 900 deg. C. during 15 min.; cool in a desiccator and weigh the $BaSO_4$. Verify that the obtained weight remains constant in effecting a second calcination of 5 min.

The percentage SO_3 content is calculated from 34·3 W. where W is the weight of $BaSO_4$ in grammes.

Colorimetric Determination of Minor Constituents

The principles and special reagents required for the various constituents are described in the publication. The procedures of the various methods are described in the following. The final determination in all cases is by visual inspection or instrumentally by means of a spectrophotometer.

TITANIUM

Treat a 1-g. sample of cement in the same way as in the method used for separating the silica. If the residue from silica separation is negligible, the filtrate from the silica contains all the titanium. If insoluble residue is appreciable, it should be fused with a small amount of 1/1 mixture of borax and sodium carbonate and then dissolved in hydrochloric acid. Add the resulting solution to the filtrate from the silica. After which, precipitate the hydroxides once. After simple washing with the ammonium nitrate solution, take up the precipitate, first with water, in a 100-ml. graduated flask, then with 25 ml. hot 1/3 sulphuric acid taking care to redissolve all the precipitate. Rinse finally the filter and the funnel with water until the final volume reaches about 90 ml. Cool the graduated flask and its contents. Then add 5 ml. of 6 per cent. hydrogen peroxide solution and make up to the mark of 100 ml. with water. Then homogenize carefully the content of the graduated flask.

PHOSPHORUS

Weigh a 0·2-g. sample into a 100 ml. squat form beaker and add 1 ml. of water and 1 ml. of concentrated nitric acid (d = 1·42). Stir and add 5 ml. of 60 per cent. perchloric acid. Cover the beaker with a watch glass and warm on a hotplate, in a fume chamber. Adjust the temperature so that thick white fumes of perchloric acid appear, after 3 min. Then move the beaker to a cooler part of the hotplate and continue the attack for 10 min. allowing to fume gently. Remove the beaker from the hotplate and cool it. Add 20 ml. of water, filter through a medium filter of 9 cm. into a conical flask of 300 ml. Wash four times with hot water. Heat the filtrate to just below boiling point and add 25 ml. of the molybdovanadic reagent. Stir, and cool the solution to normal temperature. Run 10 ml. amyl alcohol exactly measured, into a 150 ml. conical separating funnel, then add the preceding solution and washings from the conical flask. Shake vigorously for 2 min. the contents of the separating funnel and allow to settle for 5 min. Run off the aqueous layer. Run off about 1 ml. of the alcoholic layer in order to rinse the stem of the separating funnel and filter the remainder of the extraction through a small dry and retentive filter. Discard the first few drops of the filtrate and collect finally the clear amyl alcohol solution in the measuring cell.

MANGANESE

Weigh exactly 1 g. of cement into a 250-ml. beaker. While stirring add 30 or 40 ml. of water followed by 6 ml. of concentrated nitric acid (d = 1·42). Boil the mixture until all the cement has dissolved. Filter off the insoluble residue through a retentive filter of 9 cm., then wash with water. Add 5 ml. of phosphoric acid (d = 1·75) and 0·3 to 0·5 g. of potassium periodate crystals to the filtrate. Boil gently until a characteristic permanganate coloration appears. The volume of the solution must then be about 60 to 70 ml. If a permanganate coloration does not develop, reduce the acidity of the solution by cautiously adding ammonia solution.

After the colour has developed, leave the solution on a suitable regulated hotplate, at just below boiling point for half an hour. Cool and make up to exactly 100 ml.

Estimation of Free Lime

The ethylene-glycol method is recommended for the estimation of the amount of free lime, the special reagents for which test are described in the publication. The procedure is as follows.

Weigh a 0·75-g. sample into a dry conical 200-ml. flask, add 1 to 2 g. of dry sand

and mix thoroughly. Add 40 ml. of glycol, stopper the flask with a rubber bung and shake. Place the flask for 30 min. in a water bath at 65 to 70 deg.C and shake manually every 5 min.; continuous mechanical shaking is better.

The mixture to be filtered under suction on a thoroughly dry porosity 3 or 4 sintered glass filter. Except when making additions to the filtering mixture, keep the mouth of the sintered glass filter protected by an apparatus which will remove moisture and carbon dioxide from incoming air. Wash three times with 10 ml. of absolute alcohol each time, carefully rinsing the conical flask; then remove the filtration flask, add four drops of mixed indicator and titrate with 0·1N HCP until colour changes from green, through brown, to orange.

If v is the volume (in ml.) of the 0·1N hydrochloric acid used, the percentage of free lime is given by $2{\cdot}8\,v./7{\cdot}5$.

Determination of Sulphur (as Sulphide)

The principle, reagents and apparatus are described.

The procedure is to place 15 ml. of ammoniacal zinc sulphate solution or 15 ml. of ammoniacal cadmium chloride solution and 285 ml. of water in the beaker. Disperse 5 g. of cement with 10 ml. of water in the flask. Assemble the apparatus. The glass outlet tube must always be immersed in the zinc or cadmium solution. By means of the separating funnel add first 25 ml. of $SnCl_2$ solution and, then 100 ml. of HCl concentrated and diluted four times shaking carefully after each addition.

The tap of the separating funnel must be carefully closed after each reagent is added. Connect the compressed air supply, open the tap of the separating funnel and adjust the air to a moderate flow. Boil gently for 5 or 6 min. Stop heating and wait 5 or 6 min. before shutting off the air supply. Disconnect the delivery tube which then serves as a stirrer. Cool the contents of the beaker to about 20 deg. C, and add 45 ml. of KIO_3 solution with a burette (2·4). Homogenize and add about 25 ml. of concentrated hydrochloric acid. Titrate the excess of iodine with the sodium thiosulphate solution. At the end of titration (pale yellow colour of solution) add 2 ml. of starch solution and titrate until disappearance of the blue colour, thus using a volume V. Let return a faint blue colour with the iodate solution (2·4) and read the finally used volume V_0 of iodate.

The percentage of sulphur is given by $20eV_0(E-V)$, where

E = equivalent as sulphur (expressed in g. per ml.) of KIO_3 solution.
V_0 = number of ml. of KIO_3 solution used for dosing.
V = number of ml. of thiosulphate solution required for titration of excess iodine.
e = equivalent as sulphur expressed in g. per ml. of thiosulphate solution.
20 = 100 divided by weight of sample (5 g.).

Publications

The 1967 Book of A.S.T.M. Standards: Part 9—This publication contains all the A.S.T.M. Standards on cement, magnesium-oxychloride and magnesium-oxysulphate cements, lime and gypsum. There are 110 Standards, 28 per cent. of which are new, revised or changed in status since the 1966 edition. Among the new standards are specifications for gypsum veneer plastics, gypsum base for veneer plastics, and pulverised-fuel ash and other pozzolannas for use with lime.

Copies are obtainable from American Society for Testing and Materials, 1916 Race Street, Philadelphia, U.S.A. Price: 8 dollars.

If this is your problem

Stein Two-Taper System is the solution

In two-taper construction, two sizes of bricks are used, one with "fast" and one with "slow" taper, easily identified by different colours and supplied in the correct ratio to suit a given kiln diameter.

Two-taper construction has the advantages—

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Cement Industry Abroad

Western Australia.—The subsidiary in Western Australia of the Rugby Portland Cement Co., Ltd., Cockburn Cement Pty., Ltd., has been converted into a public company under the title Cockburn Cement Ltd. It will be making a public issue in Australia of 1,800,000 ordinary shares of 50 cents each at A$1·60 per share. This will raise the issued ordinary share capital of Cockburn Cement Ltd. to A$6,000,000 divided into 12,000,000 shares of 50 cents each, of which Rugby Portland Cement Co., Ltd., will own 85 per cent.

Kenya.—It is reported that during the month of March last, the two cement companies in Kenya sold a total of 41,403 tons. E.A. Portland Cement Co., Ltd., at Athi River, sold 7,297 tons, and 34,106 tons were sold by the Bamburi works of British Standard Portland Cement Co., Ltd.

Zambia.—It is reported that the plans of the Chilanga cement concern, to build a new works at Ndola on the Zambian Copperbelt, are proceeding satisfactorily. The Zambian subsidiary of the Italian construction company Federici Construction have been awarded the contract to build the new Ndola works, which is expected to cost about £5,000,000 and is scheduled to produce, 200,000 tons of cement initially. It is stated that the works will have an annual productive capacity of 500,000 tons.

The third producing unit at the existing Chilanga works is nearly complete and will increase annual production from 200,000 to 300,000 tons.

Ghana.—A Norwegian firm has agreed to participate with the Ghana Government in a company called Ghana Cement Works Ltd., which will operate the cement clinker grinding plants at Tema and Takoradi, established by the State Cement Works Corporation.

Turkey.—Three features characterising the trend of development of the Turkish cement industry in the next two years are an increase of more than 50 per cent. in the annual production, the preference for the dry process, and the change-over to plant with considerably higher capacities. In view of the rapidly growing demand for cement, the Turkish cement industry placed orders for five new dry-process plants from 1964 to 1966. These plants will produce 1,600,000 tons of cement annually. The four largest, representing a total annual capacity of 1,400,000 tons, will be equipped with Humboldt suspension preheaters.

Including the works which at present are being converted and extended from the wet process to the dry process, the annual cement production in Turkey will reach about 6,400,000 tons in 1968 compared with the present production of 4,200,000 tons. At present 40 per cent. of the cement is produced by the process but this will be increased to more than 60 per cent. In the five new works Humboldt kilns will be installed. Each will have a diameter of 4·2 m. and a length of 60 m., and will have guaranteed output of up to 1,200 tons per day.

International Symposium in Cement Chemistry

THE programme of the Fifth International Symposium on the Chemistry of Cement, which is to be held in Tokyo from October 6 to 12, 1968, has now been published, and the scope of each of the four working sessions is as follows.

CHEMISTRY OF CEMENT CLINKER: Basic chemistry of Portland cement clinker, including mineral formation, structural chemistry, phase equilibria, properties and method of analysis.

HYDRATION OF CEMENTS: Basic chemistry of the hydration of Portland cement and of other kinds of cements and cement minerals, dealing with the crystal structures and properties of hydrates, hydration kinetics and phase equilibria.

PROPERTIES OF CEMENT PASTE AND CONCRETE: Correlation between the various properties of concrete and the physico-chemical properties and behaviour of cement and cement pastes.

ADMIXTURES AND SPECIAL CEMENTS: Physico-chemical influences of surface-active agents and of various chemical by-products, gypsum, etc., on cement and concrete. Correlation between the properties of special cements and important aspects of concrete.

Full particulars of the Symposium can be obtained from the organising Committee for the Fifth international Symposium on the Chemistry of Cement, Tokyo, 1968, c/o The Cement Association of Japan Laboratory, No. 5-5, 7-Chome-Akasaka, Minato-Ku, Tokyo, Japan.

Proceedings of Silicate Conference

THE Proceedings of the Eighth Conference on the Silicate Industry (Silicons, 1965), edited by F. Tamas, are now available in English from the Publishing House of the Hungarian Academy of Sciences, Budapest. The published papers, are divided into various sections dealing with basic science, cement, ceramics, glass, quarrying and refractories.

Colloquium on Calcium Silicates

A MEETING organised jointly by the Ceramic Society and the Building Research Station took place at the B.R.S. at Garston, Herts., in September last.

A review of " Recent research on natural and artificial hydrated calcium silicates and their occurrence in cement products and autoclaved material " was presented by Prof. H. F. W. Taylor of the University of Aberdeen. The subsequent discussion demonstrated an interest in the theory of the strength of brittle materials, and it was suggested that experimental techniques for the determination of fracture mechanics on very small specimens should be developed, and correlated with phase composition and porosity and texture of calcium silicates.

Dr. A. A. Hodgson, of Cape Asbestos Fibres Ltd., introduced a discussion on " The liquid phase formed in contact with setting cement and its effect on hydration and properties, with special reference to the manufacture of asbestos cement products ". The discussion turned towards mechanical properties, and it was suggested that a fibrous structure might be developed in the set concrete.

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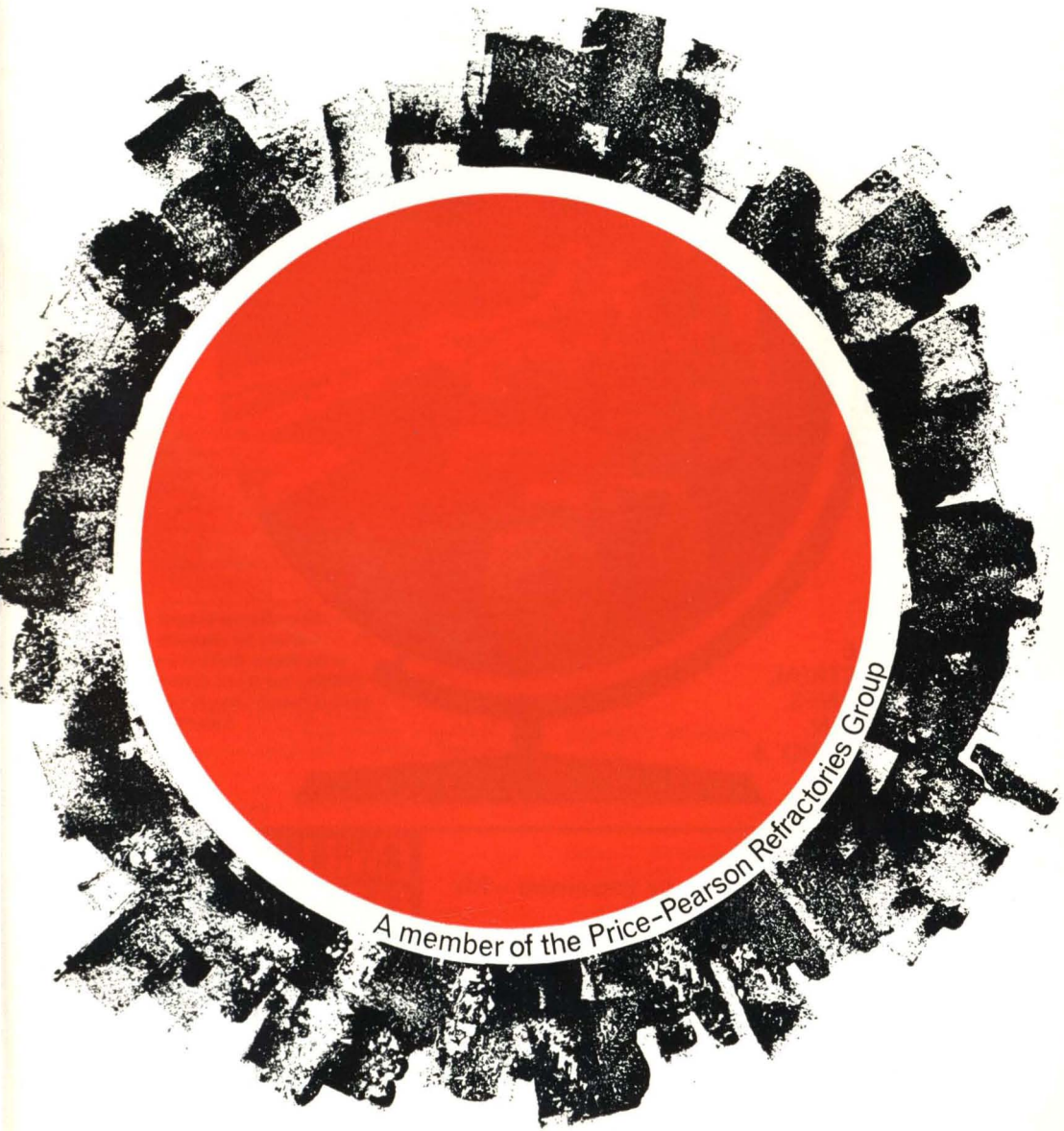

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