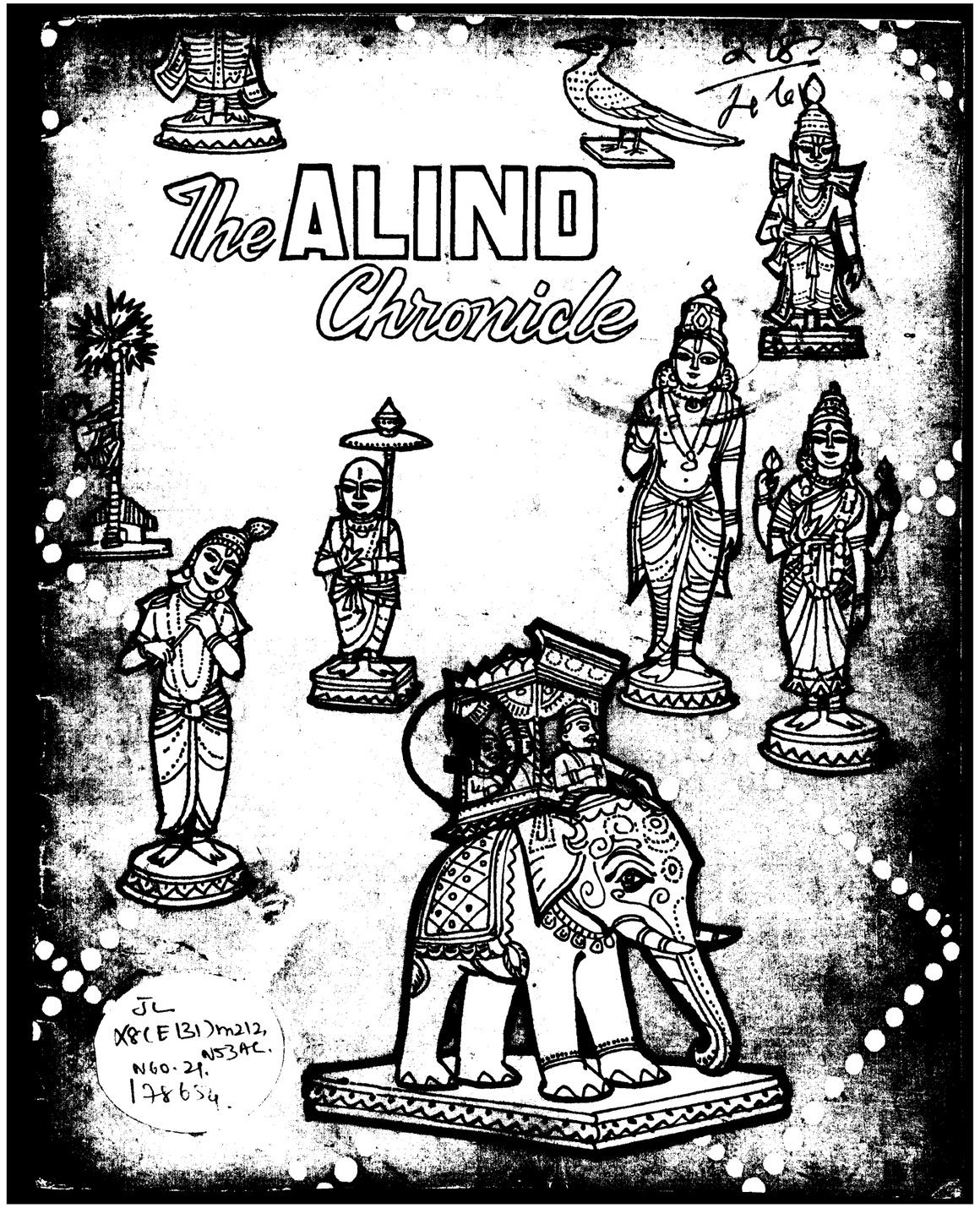


ALIND

JULY 1961

No. 21

Editor :

R. PARTHASARATHY

THE PURPOSES OF THIS PUBLICATION ARE :

(i) *To record the accomplishments and achievements of our employees, their joys and sorrows so that our other friends like our customers, shareholders and neighbours may get to know our* family *better ;*

(ii) *To encourage in our employees pride in workmanship and the high quality of our products ;*

(iii) *To help create and sustain amongst them a spirit of friendliness ; and*

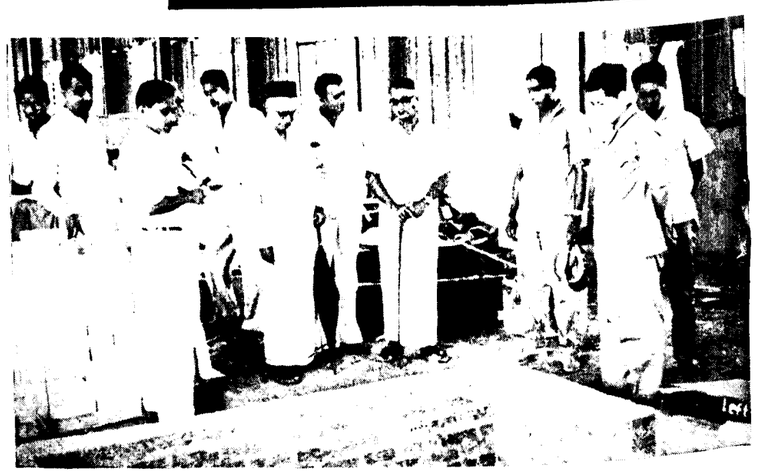
(iv) *To tell the story of our business and that of our customers and other friends so that mutual understanding and respect might be fostered.*

★

THE COVER

Alind's third plant will be located at Hyderabad, the former, fabulous capital of the Nizam and the present headquarters of the Government of Andhra Pradesh. Adorning the covers of this issue are illustrations of the famous Kondapalli toys. The Andhra village where these toys—timeless in their vivid appeal—are made is renowned for the traditional skill of its craftsmen.

News in Pictures



The Directors of the Company at the ACSR core wire plant in construction. At right are the Japanese technicians who are helping us put up this plant.

Mr. A K. Sen, Central Minister of Law at our works. To his left is S. Peer Mohammed, Sales Manager.

N. C. C. girls who were on a camp at Musliar College, Quilon, gave us the pleasure of their company (or, should we say battalion?) at Kundara.

News & Developments

U.S. Assistance for Sharavathy Project

A SIGNIFICANT CONTRIBUTION TO INDIA'S drive towards adequate electric power came with approval of two U.S. Government loans for the Sharavathy hydro-electric project equivalent to $57,775,000.

In announcing approval of the loans, Ambassador Galbraith noted that the United States has in recent months concluded other agreements with India for the construction of seven additional power projects, and that the U.S. is financing the entire cost of power facilities that will boost India's generating capacity by well over one million kW.

Sharavathy is one of the most economical hydro-electric projects in the world from the standpoint of cost per installed kW.

The second stage involves the raising of the dam to its full 188-foot height, extension of the powerhouse, the installation of five additional 89,000 kW generators, and the construction of an additional 401 miles of 220-kV transmission lines with appurtenant substations.

300-mW Thermal Station for W. Bengal

The Planning Commission has approved of a proposal made by the Government of West Bengal to set up a 300,000-kW thermal power station near Bandel at a cost of Rs. 29.9 crores. The proposed station will comprise four units, each generating 75,000 kW and supplying power to the railways and industries in the Calcutta area. The cost of the Bandel station is expected to be met out of a loan from the U. S. Development Loan Fund. The State Government will later double the capacity of the station at a cost of Rs. 22.5 crores.

Power from Liquid Gas

A new process for turning to account the expansion energy arising from the conversion of a liquid into a gas has been developed in England. The system is of special interest in view of the recent British experiment of importing mathene in liquid form for subsequent regasification.

The process is reported to be suitable for use with other gases, such as oxygen and nitrogen, which are usually transported and stored in liquid form. The liquid gas has to be compressed to a pressure well above that required at the gas delivery point. A natural heat store, like the atmosphere or a river, is then made to supply the heat necessary to start gasifying the liquid, and the gas is allowed to expand in a turbine or reciprocating expander.

The energy thus produced in the engine is used in part for the original process of compression, but this proves to absorb only a small fraction of the total. The remainder is available as mechanical power and can be used to generate electricity. After the expanding gas has done its work, it is warmed to room temperature by the natural heat store and passed on to the gas delivery point.

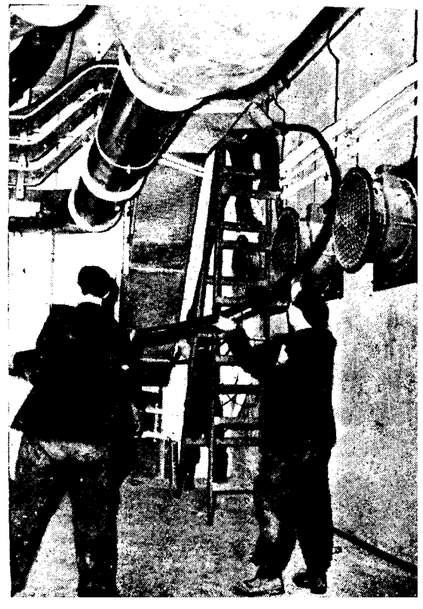
The process has been patented by British Oxygen Research and Development Ltd., England.

Alcan Stand at Electrical Engineers (A.S.E.E.) Exhibition

Since 'Solidal' plastic-insulated aluminium cable, developed by Alcan Industries and its associates, was first introduced to electrical engineers at last year's A.S.E.E Exhibition, much experience has been gained of its installation in various places. The display of Solidal cable in the present exhibition was therefore more comprehensive, reinforcing the claims originally made for it : that it is not only an efficient conductor, but light, compact, inexpensive and easy to install. Such advantages are considerable in its use for power supply and industrial installations above and below ground. Also included in the Solidal display, which is the main exhibit on the stand, is a demonstration of jointing by soldering and compression.

An adjacent display presented a selection of insulated cables with aluminium conductors and sheaths made from rod and tube supplied by Alcan Industries. They included welding and other flexible cables, on which terminations were shown.

Among the first commodities Alcan Industries supplied to the electrical industry were conductor accessories for transmission and distribution lines. During the past few years this field has been strongly developed notably by the introduction of the 'Noralgrip' range of accessories which are lighter, cheaper, and quicker to apply than earlier patterns, and by the production of a motorised compressor which enables joints to be made much more rapidly than by hand. Moreover, the company has designed and produced special fittings for the Kariba hydro-electric scheme and the River Thames crossing and is engaged on fittings for the River Forth crossing. A massive dead-end for the Thames crossing was included in the display, together with examples of typical accessories from the standard range.



The ease with which this 0·25 sq. in. solidal cable is being installed on roof bolts is a good indication of its lightness

Neriamangalam Hydro-Electric Project

On April 12. Mr. S. Radhakrishnan, Vice President of India, inaugurated the Neriamangalam Hydro-electric Project in Kerala State. It is one of the biggest of its kind in the State.

The masonry dam height of this project is 77 feet and it has a storage capacity of 100 million cubic feet of water. The expected continuous flow of water is 700 cusecs. The installed capacity is 45,000 kW. It will partly meet the growing demand for power in the Kerala State.

I.E.M.A. General Meeting

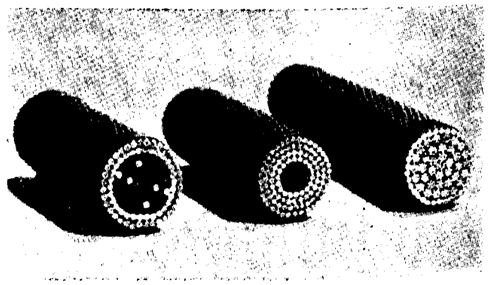
"The Third Five-Year Plan is no doubt very ambitious, but it represents a crucial stage in the fulfilment of our basic social and economic objectives. To my mind, therefore, there is no alternative but to have a big and bold plan for the economic development of the country. That alone would ensure fuller employment and a better standard of living. The interest of the electrical industries in the Third Plan is considerable as it seeks to develop machine-building and basic industries of great national importance" observed Mr. N. W. Gurjar, Chairman, I.E.M.A., presiding over the Thirteenth Annual General Meeting held at Calcutta on February 25.

Mr. Manubhai Shah, Minister for Industry, Government of India, inaugurated the session.

Continuing Mr. Gurjar observed, "The development of power resources, and a number of heavy engineering and machine-building industries are going to make a significant contribution to the development of electrical industries". The targets fixed for them in the Third Plan are shown in the adjoining two columns.

New EHV Aluminium Conductor

Aluminum Company of America has developed two unique designs for all-aluminium electrical conductors for installation on Bonneville Power administration's 460 kV test line, near Sandy, Ore. One of the new designs employs flexible conduit cores; the other uses — for the first time in a conductor of this size —a "rope lay" configuration. The "flexible aluminium conduit" cable consists of four layers of 5005 alloy wire helically wound around the flexible conduit core. Overall conductor diameter is 2.14 inches. The flexible conduit core is a standard 0.825 in. outside diameter flexible conduit. The "rope lay" 2.13-inch conductor is similar in appearance and structural composition to its namesake, stranded rope. It is composed of groups of wires treated as single strands, helically laid around a similar group serving as the central core. It is encircled with an outer layer of conventional single wire strands. Inner wires are 5005 alloy : the outer layer of strands is EC aluminium alloy.



Alcoa's new EHV conductor designs

World's highest transmission line Voltage

The world's highest electrical transmission line voltage, 720 kV, was applied on December 8 to a portion of the 4½ mile EHV (extra high voltage) line erected by the General Electric Co. near Pittsfield, Mass. The line is a full-scale prototype and will be used for the testing and development of towers, conductors and station equipment under actual operating conditions in the EHV range up to 750 kV.

Project EHV will be operated first at 460 to 500 kV, then stepped up to 700 kV level in 1962. About 250 instruments are located along the line to measure meteorological, electrical and mechanical data. Readings will be recorded and processed automatically by a scanning device which under normal conditions will sample all measurements in 20-minute intervals. During severe weather conditions, scanning is speeded up to a two-minute interval.

Industry	*Production*	*Capacity*
1. Electric Motors	2.5 million h.p.	3.0 million h.p.
2. Transformer	4.4 million kVa.	5.0 million kVa.
3. *Switchgear and Controlgear :*		
(i) 11 kV Circuit-breakers and switch boards incorporating the same ...	2,250	2,650
(ii) LT Circuit breakers and switch boards incorporating the same	18,000	21,000
(iii) Motor starters	225,000	265,000
(iv) Iron-clad switches	3.6 million	4.2 million
4. *Cables and Wires :*		
(i) ACSR and All-Aluminium Conductors	30,000 tons	45,000 tons
(ii) VIR and PVC Cables	525 million core yards	900 million core yards
(iii) Paper Insulated Power Cables ...	3,750 miles	4,800 miles
(iv) Bare Copper Conductors	15,000 tons	No additional capacity needed
(v) Winding Wires	29,000 tons	38,000 tons

* Basis : Development Council Working Group Estimates.

Mr. K. Kamaraj, Chief Minister, Madras State | *Mr. Gordon Churchill, M.P., Leader of the House and Minister for Veterans' Affairs, Canada* | *Mr. V. P. Appadurai, Chief Engineer, Electricity, Madras State*

THE KUNDAH PROJECT

POWER HOUSE 2 IN THE KUNDAH Hydro-electric Project was formally inaugurated by Mr. Gordon Churchill, Minister for Veterans' Affairs, Canada, early in January. Mr. K. Kamaraj, Chief Minister of the State, presided.

Pressing a remote control switch Mr. Gordon Churchill started the power generators at Gedde ten miles away, and also set in motion the blasting of rocks for excavation for the extension of the Kundah project.

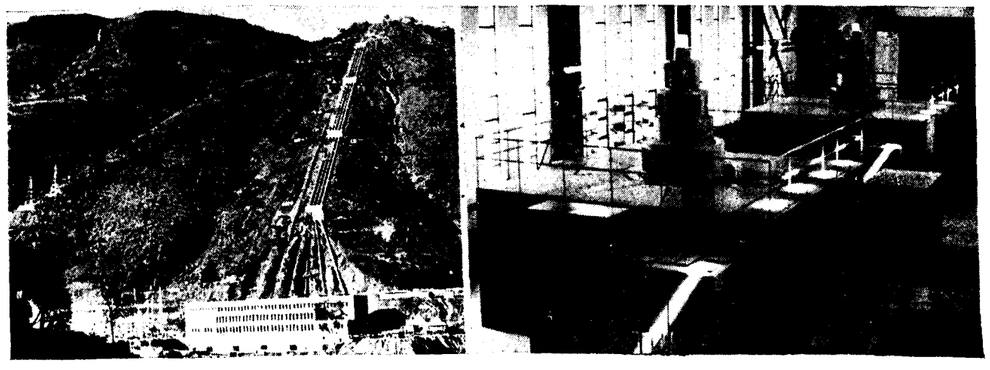
The project—the sixth and the biggest power scheme to be launched in the State—when fully completed is to harness the waters of the Kundah river and generate a firm power of 343,000 kW with an installed capacity of 420,000 kW in two phases, utilising a head of over 5,000 ft.

The total cost of the first and second stages of the project was Rs. 35.44 crores towards which Canada had contributed 23 million dollars (about Rs. 11 crores) under the Colombo Plan aid. The third stage of the project is estimated to cost Rs. 23.06 crores.

Mr. Gordon Churchill said that his Government had agreed to participate in the further developments—third and final stage—of the Project by providing the essential equipment and services representing the foreign exchange costs totalling about Rs. 9 crores.

"I have learned of the tremendous effort to which India has committed herself by adopting a series of Five-Year Plans for national development," he added. "I now have a deeper appreciation of the noble purpose behind this plan—that rural

Kundah Power House



India should be rebuilt and the foundations of industrial progress laid, opportunities for the under-privileged expanded and all parts of the country developed in a way," he observed.

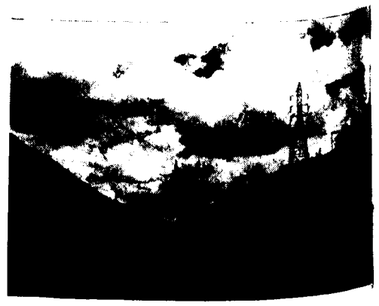
Mr. Jaisukhlal Hathi, Union Deputy Minister, thanked the Canadian Government on behalf of the Government of India for the aid and the spirit of good-will, friendliness and co-operation behind it.

Tribute to Canada's Technicians

Mr. V. Ramaiah, State Minister for Electricity, in his welcome speech referred to the monumental achievement in the brief span of four years of executing the first two stages of the Kundah Project, thanks to the magnificent contribution made by the great country of Canada. He testified to the tremendous co-operation and abundance of goodwill of administrative officers, engineers, technicians and welders from Canada. He congratulated the State Electricity Board which in 32 years since its formation had made excellent progress in speeding up power schemes. He paid a tribute to the great service being rendered by Mr. V. P. Appadurai, State Chief Engineer, in executing this project. Ordinary people too had contributed their share and were the biggest source of strength to them. Madras, Mr. Ramaiah said, was leading other States in rural electrification. Towards the end of the Third Plan period she would be having 1.5 million kilowatts of power. But in spite of this phenomenal increase, she would not be able to meet the growing demand for power. Therefore it was his earnest and sincere desire that the Canadian Government should always have in their mind our power needs and come to our help as they had been good enough to do so far. He assured the small land-owners of Nilgiris who had been displaced and hard hit that their interests would be protected without undue delay.

Mr. V. P. Appadurai, Chief Engineer, explained the salient features of the Project.

Mr. K. Kamaraj, Chief Minister, who presided, expressed his Government's gratitude to the Canadian Minister and other visiting dignitaries for their participation in the function and said that power was the sheet-anchor of all industrial enterprises and that he was glad that our engineers were utilising all the natural resources to the best of their ability in the service of the people.



Power flows from Kundah towers

Mr. Ronning, High Commissioner for Canada in India, also spoke.

Mr. S. R. Kaiwar, Chairman, Electricity Board, proposed a vote of thanks.

STATEMENT ABOUT OWNERSHIP AND OTHER PARTICULARS ABOUT NEWSPAPER TO BE PUBLISHED IN THE FIRST ISSUE EVERY YEAR AFTER THE LAST DAY OF FEBRUARY

FORM IV

(See Rule 8)

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6.	Names and addresses of individuals who own the newspaper and partners or shareholders holding more than one per cent of the total capital	The Aluminium Industries Limited, Kundara, Kerala.

I, R. Parthasarathy, hereby declare that the particulars given above are true to the best of my knowledge and belief.

August 1961.

(Sd.) R. PARTHASARATHY
Signature of the Publisher

Technical Notes

POWER TRANSMISSION FROM CHAMBAL

by G. V. ANANTHARAMIAH and B. K. SHUKLA

THE FIRM POWER AVAILABLE FROM THE Chambal Valley Development Scheme, when all the three stages of the scheme are executed, would be 2,15,000 kW at 60 per cent load factor and this is to be shared equally by the two participating States of Rajasthan and Madhya Pradesh. For reaping the full benefits of the scheme, a carefully laid out transmission system is necessary to transmit the power generated at the hydro stations to the distant load centres.

The transmission voltage had to be decided, taking into consideration the present and probable future voltage of other lines in the vicinity, and the probability of tying them together at a common voltage later on. In view of the comparatively small blocks of power to be transmitted and the distant locations of the load centres, transmission voltage of 132 kV was found to be the most economical one and was therefore chosen for tying the three power houses as well as for the main radial lines linking up the major receiving stations situated far way ; and for the secondary lines, a transmission voltage of 66 kV was chosen. These voltages being among the preferred transmission voltages in this country, any future interlinking with other power systems in the area would also be facilitated.

Transmission Layout

The layout of the transmission system under the first stage of Chambal Valley development in both Madhya Pradesh and Rajasthan is shown in Fig. 1, and consists of the lines indicated in the Tables I and II.

Table I. Transmission Lines in Madhya Pradesh

Sl. No.	*Name of line*	*Route mile*	*Associated substation Capacity*	*Remarks*
1.	Gandhisagar-Ujjain 132 kV double circuit	117	60 mVA at Ujjain	
2.	Ujjain-Bhopal 132 kV single circuit	118	7.5 mVA at Bhopal	Provision for second transformer in the 2nd stage.
3.	Gandhisagar-Neemuch 132 kV single circuit	48	20 mVA at Neemuch	One transformer to be shifted.
4.	Sawaimadhopur-Gwalior 132 kV double circuit	128	15 mVA at Gwalior	Only one circuit to be strung initially.
5.	Ujjain-Indore 66 kV double circuit	32	30 mVA at Indore	
6.	Ujjain-Ratlam, via, Nagda, 66 kV single circuit	57	10 mVA, each at Ratlam & Nagda	
7.	Neemuch-Mandsaur 66 kV single circuit	28	5 mVA at Mandsaur	

Table II. Transmission Lines in Rajasthan

1.	Gandhisagar Dam Power House to Sawaimadhopur 132 kV double circuit	117	Kotah 6 mVA, Lakheri 12 mVA, Sawaimadhopur 12 mVA	
2.	Sawaimadhopur-Jaipur 132 kV single circuit	87	Jaipur 38 mVA	
3.	Kotah-Ajmer 132 kV single circuit.	117	Ajmer 15 mVA	
4.	Neemuch-Udaipur 132 kV single circuit.	81	Udaipur 23 mVA	

Salient Features of the Transmission Lines (Madhya Pradesh Portion)

Towers : All the 132 kV and 66 kV transmission lines are run on latticed, bolted-type, galvanised steel towers designed for a wind pressure of 15 lbs. per s.ft. acting on 1½ times the exposed area of one face of the tower and two-thirds the projected area of each conductor.

The details of the types of towers designed and used on the various lines are given in Figs. 2 to 6.

The factors of safety based on crippling strength of struts and elastic limit of tension members in the towers and cross-arms are 2.5 under normal conditions and 1.5 under broken wire conditions. The factors of safety maintained against overturning are also the same as above. One top conductor or earthwire is assumed broken for tangent towers of double circuit lines and tangent and angle towers of single circuit lines. For tangent tower, the unbalanced pull due to the broken conductor has been taken as equal to 75 per cent of the maximum working tension of the conductor. For the dead-end towers of single circuit lines, one middle conductor is assumed broken. Three conductors are assumed broken on the same side for angle and dead-end towers of double circuit lines.

The total requirement of steel for the fabrication of towers for the 528 route miles of 132 kV and 66 kV transmission lines in Madhya Pradesh, was of the order of about 8,000 tons, just at a time when the country was faced with the acute shortage of steel on the one hand and severe strain on its foreign exchange resources on the other. Under such compelling circumstances, towers for Gandhisagar-Ujjain ; Ujjain-Bhopal ; Ujjain-Indore and Ujjain-Nagda-Ratlam lines, totalling about 5,000 tons, were ordered on indigenous manufacturers accepting slightly higher rates and delayed deliveries compared to imported towers, purely on preferential policy considerations to encourage indigenous industries.

However, towers for Sawaimadhopur-Gwalior, Gandhisagar-Neemuch and Neemuch-Mandsaur lines, totalling about 3,000 tons only, were imported from Italy.

Fully galvanised towers were preferred to painted towers in order to eliminate the additional maintenance problems that the latter would have posed, during the life period of the transmission lines.

The peaks of towers have been so designed as to enable the earthwire to form a protective angle of 30 in the case of all tangent (suspension) towers and 35 in the case of all angle and dead-end (strain) towers.

The conductor to conductor clearances maintained in the tower design are indicated in Figs. 2 to 6 and minimum live-metal clearances provided between live parts and earthed tower on cross-arm members are given below col. 1.

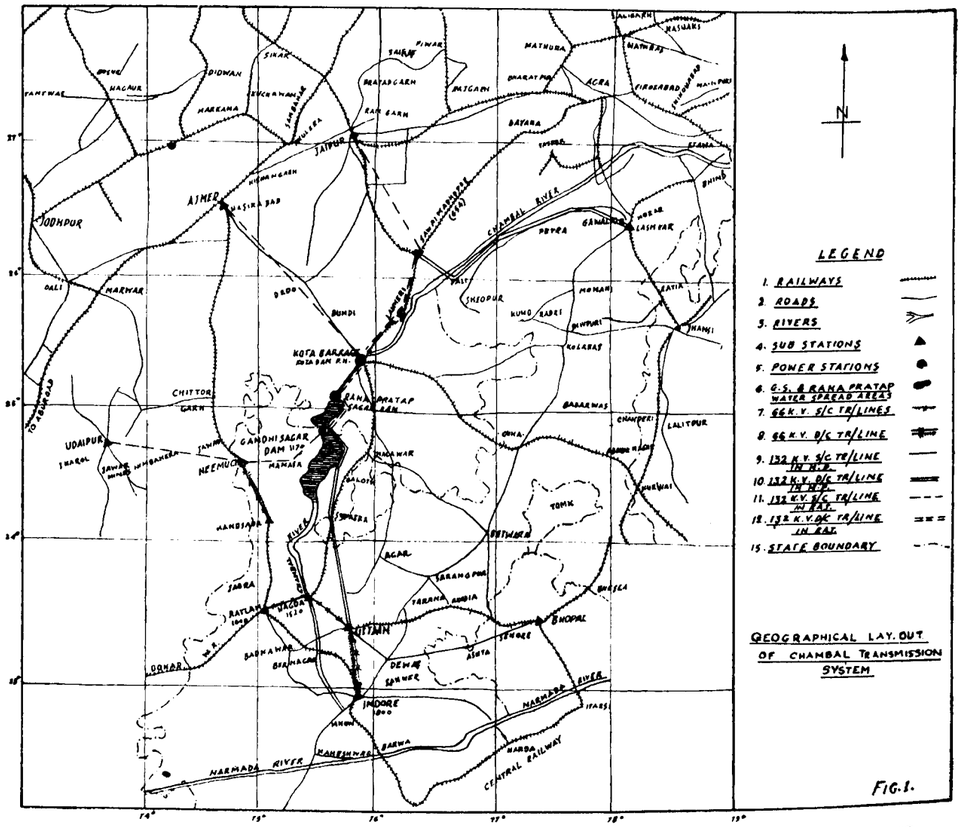


FIG. 1.

		66 kV line	132 kV line
(a)	Suspension strings in still air and when deflected by wind upto 30 from the normal position of the string.	30″	60″
(b)	Suspension strings when deflected upto 45 from the normal position in the case of 66 kV lines, and upto 60 in the case of 132 kV lines.	24″	42″
(c)	Strain strings at strain towers	30″	60″
(d)	Jumper strings at strain towers when deflected by wind upto 10	30″	60″
(e)	Clearance between bottom conductor and ground.	18′-20′	20 feet

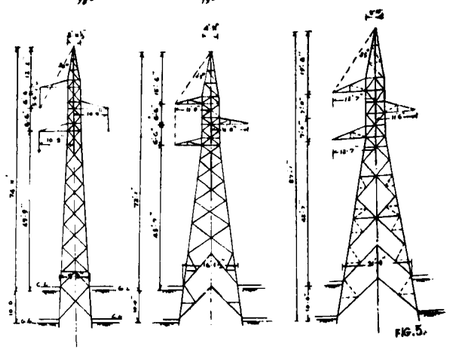
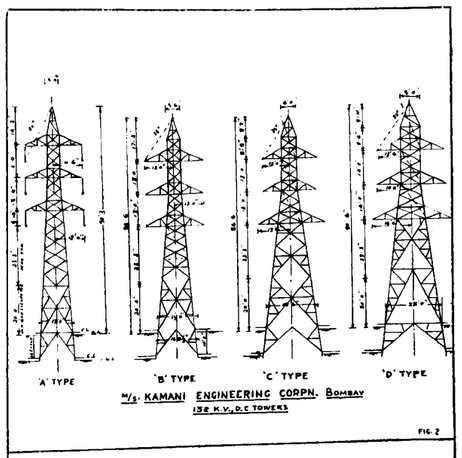
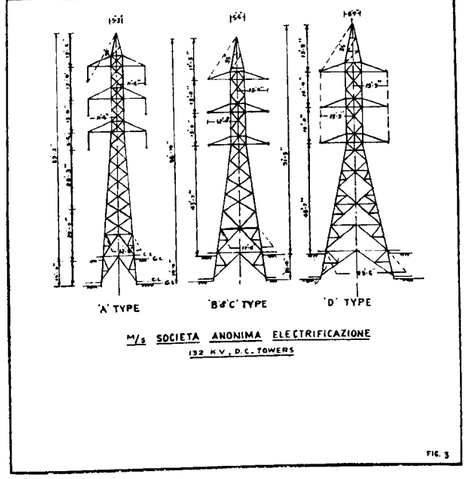


FIG. 5.
132 K.V. S/C TOWERS OF M/S SOCIETA ANONIMA ELECTRIFICAZIONE S.p.A. MILANO



M/s. KAMANI ENGINEERING CORPN. BOMBAY
132 K.V., D.C TOWERS
FIG. 2



M/s SOCIETA ANONIMA ELECTRIFICAZIONE
132 K.V., D.C. TOWERS
FIG. 3

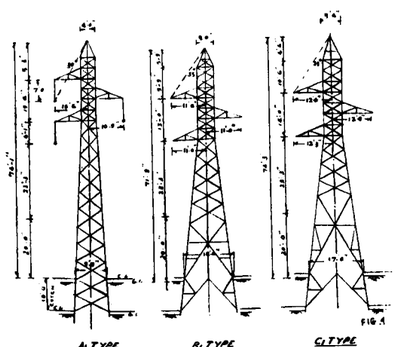


FIG. 4
132 K.V. S/C TOWERS OF M/S. KAMANI ENGINEERING CORPN Ltd. BOMBAY

The design of tower foundations is based on an ultimate bearing pressure on soil of 2½ tons per s.ft., and the factors of safety provided are not less than 2.5 and 1.5 under normal and broken wire conditions. For design of footings, it is assumed that the earth weighs 90 lbs. per c.ft. and that the base of the footings will engage the frustrum of an inverted pyramid whose sides make an angle of 30° with the vertical (i.e., the angle of repose) and the weight of concrete has been taken as 145 lbs., per c.ft. All the four footings of the towers are similar, irrespective of compression or uplift. Effective bonding between the stubs and concrete is ensured by the provision of angle cleats spaced suitably or a combination of angle cleats and keying rods attached on alternate flanges of the stub angles. The joints between tower stubs and main leg members of the superstructures have been kept at one foot above ground level and are not encased in concrete.

Power Conductors

'ACSR' 'Panther' (30/0.118″ Al plus 7/0.118″ st.) corresponding to the standard nominal copper area of 0.2 sq. inch has been used as power conductor on all the 132 kV transmission lines, except the Ujjain-Bhopal line on which ACSR 'Wolf' (30/0.102″ Al plus 7/0.102″ st.) corresponding to the standard nominal copper area of 0.15 sq. inch has been used.

The power conductors used on the 66 kV lines are ACSR 'Dog' (6/0.186″ Al. plus 7/0.062″ st.) corresponding to the standard nominal copper area of 0.1 sq. inch.

Ground Wire

One 7/0.160″ galvanised steel earthwire of 70 tons quality on all the 132 kV towers and one 7/0.128″ galvanised steel earthwire of 45 tons quality on all the 66 kV towers, is run over the full length of these lines.

Insulators

Brown glazed porcelain insulators imported from Messrs. Nippon Gaishi Kaisha Ltd., Japan, through their Indian Agents Messrs. B. Pannalal and Company have been used. All insulators are of the Ball & Socket type. Suspension strings are used for angles upto 2° and tension strings for larger angles. Double tension and/or double suspension strings have been used for all railway crossings. Standard discs of size 10″ × 5½″ have been used for suspension strings of 132 kV lines and for both suspension and tension strings of 66 kV lines. Discs of size 10″ × 5¾″ have been used in tension strings of 132 kV lines.

Nine discs for suspension and 10 discs for tension strings have been used for 132 kV lines whereas five discs for suspension and 6 discs for tension strings have been used for the 66 kV lines. On the approach towers near the substations, over a length of about one mile on either side, the line insulation has been reduced to the extent of one disc relative to the normal string insulation level, for both 132 kV and 66 kV lines, in order to prevent steep wave fronts from reaching the substation equipment. The 66 kV and 132 kV suspension and tension strings have arcing horns on the line side only.

Lightning Protection

Single groundwire is provided for all the transmission lines so as to give a protective angle of 30 to 35 and to afford adequate protection against lightning.

The impulse strengths of the line insulation provided for the 66 kV and 132 kV lines by using 5 and 9 insulator discs are, 510 and 825 kV respectively. Assuming a maximum lightning surge current of 50,000 amps. under the severest lightning discharges, the limiting footing resistance works out to 0.02 ohm per kV of impulse strength of line insulation. On this basis the permissible footing resistance works out to 10.2 ohms and 16.5 ohms for the 66 kV and 132 kV lines respectively. Every tower of the 66 kV and 132 kV lines has been earthed by means of a 10-foot long perforated galvanised iron pipe buried in the ground and electrically connected to one of the tower legs by 0.1 sq. inch tinned copper tape 1½ in. × 3/32 in. thick. The pipe is surrounded with a 6 in. layer of finely broken coke. The continuous earthwire has been bonded properly to all the towers. The soil resistivity in this area ranges from a minimum of 2,000 ohms to 66,000 ohms per cubic centimeter (representative average figure being less than 7,000 ohms.), as revealed by the tests conducted with an earth-test megger, by the four electrode method.

Safety Measures

All the towers have been properly grounded as already mentioned above, and enamelled 'Danger' boards have been provided on all towers in the vicinity of villages, railway and road crossings.

Anti-climbing device, consisting of barbed wire, looped around tower legs to a height of ten feet, is also provided on all towers.

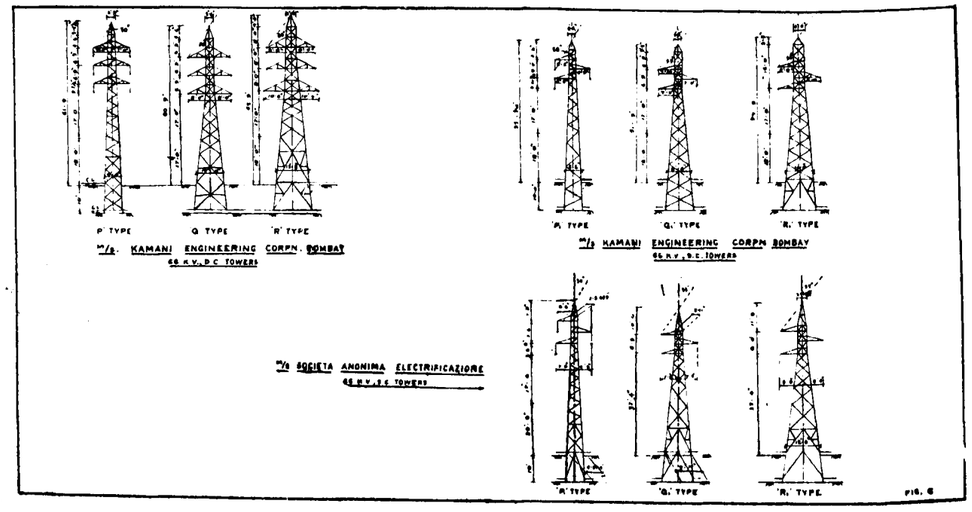
Other Fittings

Step-bolts have been provided on one leg of every tower, and number plates giving the location number are mounted on each tower. Galvanised steel serrated bird guards have been provided above the suspension insulators on the cross-arms of all tangent towers.

Stockbridge dampers consisting of resiliently supported weights equipped with a suitable clamp for attaching them to the conductor have been installed at all strain locations in order to damp out resonant vibrations in power conductors. One damper has been used per conductor for spans up to 1,200 feet and two for spans longer than that. Tapered armour rods have been installed as reinforcement at all suspension points to protect the aluminium strands of conductors from possible fatigue failure due to resonant vibrations. They are also intended to provide protection against flash-over burns.

At all the railway and telecommunication line crossings, no guarding arrangements have been made as provided for in the extant code of practice governing such crossings and these have been approved by the concerning departments. All cases of parallelism with the existing telecommunication lines along the roads and railways have been approved by the Power and Telecommunication Co-ordination Committee and the Posts and Telegraphs department have provided adequate protective remedial measures on their lines ; wherever necessary, at the cost of the project.

—*Courtesy*: INDIAN JOURNAL OF POWER & RIVER VALLEY DEVELOPMENT.



USE OF ALUMINIUM CONDUCTORS IN INDUSTRIAL POWER SYSTEMS

ARTHUR L. NELSON

FELLOW AIEE

IN THE PAST DECADE, PARTICULARLY SINCE 1945 and 1946, a great deal has been written and there has been much discussion regarding the use of aluminium conductors in electric power systems. During this period, the use of aluminium for this purpose has very greatly increased.

The incentive to the greater consideration and the greatly increased use of aluminium on electric power systems during this period has been due to the tremendous expansion programme being carried out by the industrial and utility companies in the United States, together with the needs of the Federal Government in connection with the defence programme. The requirements of such programmes became so great that in many cases it was difficult to obtain the copper conductors needed, and a substitute or alternate was sought. Aluminium conductors were obviously the most suitable, and rapid advances were made in connection with their use. The outstanding factors in this situation are price and availability. In no other metal are these factors so evident as in aluminium. In the electrical industry, faced with the continuing and probably inevitable increase in the cost of copper, the economic factor is of the greatest importance. Regarding availability, aluminium now ranks second in volumetric production, being exceeded only by steel, and large increases in production facilities are now planned or already under way.

The price history of aluminium has been very favourable and has greatly stimulated its use. A long downward trend in the price of this metal started after World War I and continued practically without interruption until the end of 1948. While the price has increased somewhat under recent inflationary pressures from the postwar low of 14 cents, it is still the only major metal the price of which is below the prices of the prewar period. Table I shows the comparative prices of aluminium with several competitive metals for the year 1920 (the inflationary high point following World War I), the year 1940 (the year before the United States entered World War II), and the year 1951.

Aluminium is the most widespread metal found in the earth's crust, indicated by ratios from geological surveys shown in Table II. It is present in an amount twice as great as that of iron, and approximately 800 times as great as that of copper.

The plant capacity for producing aluminium in the United States is tremendous, and has grown with amazing rapidity during recent years. In 1940 this country produced 24 per cent of the world's aluminium, and in 1950, 44 per cent. Table III shows the present capacities and the additional capacities proposed by the four major producers of aluminium in the United States.

Aluminium plants in the United States and Canada now produce approximately three-quarters of the total world production. Thus far, therefore, the situation as regards the price of aluminium and the quantity of the metal which will be available is a very promising one.

The physical properties of aluminium

Table I. Metal Prices, Cents per Pound

	1951	1940	1920
Aluminium ...	18.0	18.7	32.7
Copper ...	24.5	11.4	17.5
Steel ...	2.7	1.5	2.6
Lead ...	19.1	5.2	8.1
Zinc ...	20.3	6.7	8.1

Table II. Metals in Earth's Crust

Metal	*Ratio*	
Silicon ...	100.0	(26 per cent of earth's crust)
Aluminium ...	30.8	(8 per cent of earth's crust)
Iron ...	16.6	
Calcium ...	13.1	
Sodium ...	10.0	
Potassium ...	9.3	
Magnesium ...	7.3	
Titanium ...	2.47	
Chromium ...	0.139	
Nickel ...	0.077	
Vanadium ...	0.064	
Copper ...	0.037	(0.0096 per cent of earth's crust)
Zinc ...	0.0140	
Lead ...	0.0077	(0.002 per cent of earth's crust)

are favourable to its use for electric conductors. Of the present applications, the best known and most widely used are in the form of cable and bus bars, aluminium transmission cable, ACSR, extruded aluminium shapes, and drawn or extruded aluminium tubing for bus installations. The principal characteristics of aluminium and its commercial alloys are as follows :

1. Low specific gravity (2.70, as compared to 7.85 for steel and 8.90 for copper).
2. High electrical conductivity—up to 61 per cent of International Annealed Copper Standard (IACS).
3. Non-magnetic characteristics.
4. High thermal conductivity.
5. High strength of aluminium alloys.
6. Excellent resistance to corrosion.
7. Ease of fabrication.

In the manufacturing process of drawing, annealing, and stranding aluminium, apparently no serious difficulties are encountered. In 1951, H. S. Spaulding said, "One thing I would like to emphasize is that there is nothing mysterious or difficult about the drawing of EC aluminium. . . Drafting is much the same as for copper. . . Die practice is similar to that for copper and both tungsten carbide and diamond dies are used."[1]

Aluminium is annealed to give a wide range of mechanical properties. The annealed EC grade has a typical tensile strength of 12,000 psi, a typical yield strength of 4,000 psi, and an elongation of 55 per cent. The strongest commercial extrusion alloy (*75S-T6*) has a tensile strength of 82,000 psi, a typical yield strength of 72,000 psi, and an elongation of 11 per cent. Aluminium alloys have an excellent resistance to corrosion because a thin, dense, and inert oxide film forms on the surface of the metal, which tends to shield the underlying metal from chemical attack.

In view of the tremendous plant expansion programme being carried out in this country, stimulated by the fact that under such conditions copper is in short supply, we now come to the point where there is deep interest shown in the use of aluminium for electrical conductors as an alternate to copper. Its many advantages of price and availability due to our vast production facilities, and its many favourable physical characteristics, are now appreciated, and its use is greatly increasing. In this connection, our great electrical industry, up to the last ten years, has been built up almost entirely on the basis of using copper for electrical conductors. Practically all design, construction, and operating details and practices, carefully and thoroughly worked out and subjected to many years of experience, have been based on copper. Many of the details have not yet been completely and satisfactorily worked out on the basis of aluminium. There are also certain situations where aluminium, in spite of its many favourable characteristics, is at a disadvantage.

It is heartening to note the energy, resourcefulness, and intelligence with which the engineering staffs of the industrial companies, power companies, and manufacturing companies are tackling the solution of the problems involved, and it is a tribute to the initiative and the courage of American engineers. I believe that satisfactory solutions will be reached for the use of aluminium, as they have been in the past for copper.

An important problem encountered in the connection of aluminium wire or cable to electrical equipment, and one which is being carefully studied, is that of creep or relaxation under pressure. The creep rate for aluminium at a given temperature and pressure is considerably greater than that for copper. For this reason connectors for aluminium conductors must be designed with adequate contact areas to keep the stresses within the conductor to much lower values than might be permitted with copper.

Regarding insulation, the manufacture of insulated wire and cable with aluminium conductors follows essentially the same pattern and uses the same equipment as does insulated wire and cable with copper conductors. Aluminium cables are manufactured with rubber, and with varnished cambric and paper insulations, as well as with various types of synthetic insulations. Aluminium here has one important advantage in that when used under rubber insulations it has high resistance to corrosion from sulphur whereas copper is easily corroded. Conversely, copper acts as a catalyst and accelerates the deterioration of rubber when in direct contact with it. Protection is accomplished by tinning the copper surface. However, under severely moist conditions, this is a temporary measure only, as the protective metallic layer will itself eventually corrode, resulting in undesirable copper-to-rubber contact. Aluminium does not corrode under rubber compounds, nor will it affect in any way the life of rubber insulations.

In this connection, the Simplex Wire and Cable Company manufacture aluminium cable with an insulation which they call Simplex Anhydrex *XX*. This insulation will operate satisfactorily at temperatures up to 176 F (80 C) in either wet or dry locations, at voltages up to 17,000. This is a higher temperature rating than is used for conventional insulations, and often reduces the sizes of aluminium cables and the sizes of ducts through which they could be run for any given current to be carried, thus tending to reduce the cost and increase the economy of the installation.

In this paper I have not attempted to cover at length the development of the many details of manufacture, construction, and use of aluminium cable, since this has been treated so completely in recent years in the many articles published in engineering magazines and in the *Proceedings* of engineering societies.

Stimulated, by the short supply of copper and, also, to a considerable degree because of the price and economic situation, aluminium has come to be widely used in many of our power systems, both industrial and utility, particularly in transmission and distribution.

As has been mentioned, the Reynolds Company, in the new Texas plant, has used aluminium busses to carry the electric current (more than 100,000 amperes) from power plants to pots in the main factory.

At the plant of the Columbia Southern Chemical Corporation at Corpus Christi, Tex., for the increased production of chlorine aluminium conductors have been used in certain sections of the plant. Aluminium cables up to 250,000 CM with Okolite insulation, and operating at 13,800 volts were used.

The operating companies of the American Gas and Electric Company system are now using aluminium in place of copper to the greatest extent possible for overhead conductors. On a footage basis they use about 80 per cent aluminium and 20 per cent copper. Copper is used only for distribution lines where it is necessary to replace part of the conductors of a copper circuit for maintenance purposes, or to add one or more conductors to an existing copper circuit.[2]

The Consolidated Edison Company of New York, Inc., during the first quarter of 1952, completed plans to install 50,000 feet of network mains cable consisting of 350,000-cm 37-strand aluminium conductor, rubber-insulated and with Neoprene jacket. Following this experimental installation, more extensive use will be made of aluminium conductors depending on the available supply of aluminium versus copper, size of available conduits, and economic considerations.[2]

The experience of the Oklahoma Gas and Electric Company with aluminium as a conductor for urban distribution systems leads them to classify it as fully acceptable. They state frankly that they do not like it as well as copper but that their preference for copper fails to support much of a premium in price.[3]

Recent plant expansions of the Aluminium Company of America have all been wired completely with insulated aluminium wire and cable. This company's new 30-story office building in Pittsburgh is wired completely with aluminium wire and cable in sizes from No. 12 through 3,000 CM.[4]

From the foregoing consideration of aluminium for use in electrical conductors, we may draw the following conclusions.

The use of aluminium for electrical conductors in our industrial and utility power systems has increased tremendously in the last decade, its use stimulated primarily by the short supply of copper caused by extensive plant expansion as well as by the requirements of our national defence programme.

In addition, aluminium as an electrical conductor has a number of definite advantages which should be given proper consideration—a good price history (it is the only major metal which has a long and generally continuous downward trend); availability in large quantities, comprising 8 per cent of the earth's crust; manufacturing facilities of tremendous capacity in the United States and in Canada which are being rapidly expanded to even greater capacities; many physical properties which make it desirable in electrical conductors, including low specific gravity, high electric conductivity, high thermal conductivity, excellent resistance to corrosion, and ease of fabrication.

There are, however, both advantages and disadvantages to aluminium conductors as compared to copper. Their future will depend upon their adaptability to different types of service and to their economic characteristics.

Also, up to the last decade, all our technology has been based on the use of copper. Since it has taken about 70 years to develop our present skill in using copper, common sense tells us that skill in the use of aluminium is not likely to be duplicated in a few months or even a few years. The acceptance and use of this type of material for electrical conductors should be based on facts and engineering.

In preparing this paper I have approached the subject, naturally, from the point of view of the independent consulting engineer whose duty is to assist the owner in obtaining the most economical design of new plant and to protect him against the use of material or equipment which would not be suitable for his purposes, and which would thus result in unsatisfactory operation and in the loss of the capital investment. I have followed with great interest the increased use of aluminium for electrical conductors in power systems, the many details connected therewith, and other advantages and developments in connection with electric power systems, such as the use of higher voltages, metal-clad switchgear, and outdoor plant installations.

It seems to me that American engineers are attacking the problems involved with their usual energy, intelligence and courage, and with the very nice sense of friendly co-operation which is typical of them. I expect to see continued and increased use of aluminium conductors as the many problems involved are gradually solved and as the economics justifies their use.

—*Courtesy*:

Symposium on the use of aluminium for insulated conductors. A I E E, New York.

References

1. *Electric Light and Power*, Chicago, Ill., Feb. 1952.
2. *Electrical World*, New York, N. Y., Jan. 1952.
3. *Proceedings*, Insulated Power Cable Engineers Association, Montclair, N. J.

Our Family

We said welcome to . . .

D. G. Nayar, Probationer, Accounts
P. Haridas, Probationer (Plant No. 3)
G. P. Nair, Stenographer
C. M. Jacob, Typist-Clerk
K. Jose Thomas, Asst. Engineer
C. P. Gopalankutty, Clerk
T. R. Chandrasekharan Nair, Clerk
N. V. Namboothiri, Typist
K. M. Oommen (Plant No. 3)
N. Ramachandra Panicker (Plant No. 3)
N. Mathai (Plant No. 3)
V. K. Gopalakrishnan Nair (Plant No. 3)
Francs Smithy (Plant No. 3)
L. Vasu Pillai (Plant No. 1)
K. Phalgunan Pillai (Plant No. 3)
P. K. Gopinathan Nair (Plant No. 1)
N. Damodaran Pillai (Plant No. 1)
D. Samson (Plant No. 1)
P. K. Mathen (Plant No. 1)
K. M. Koshy (Plant No. 1)

APPRENTICES

G. Prabhakaran
N. Sreedharan
L. Jayadevan
G. Thankappan
G. Thankachen
D. Yohannan
K. K. Kochummen
N. Titus
P. I. Abraham
J. H. Gomez
V. G. Raveendranathan Unnithan
V. Vidyadharan
C. Vasudevan Nair
A. Nasimuddin
N. Somasekharan Pillai
M. Abdul Rahim
R. Alibi
Simon Francis
M. Thomas

K. T. Rao—Shakuntala

Rajan Philip —Thankamma

M. P. Aravindakshan—Rajeswari

P. M. Joseph—Alice

R. Parthasarthy, Publicity Officer, returned to Madras on March 13, after his three-month assignment in Paris. While there, he was with Synergie Publicite et Propagonde, a leading French Advertising Agency. During his sojourn abroad, he also visited the offices of several advertising agencies in London and other cities in Europe.

TRAINEES

R. Sreedharan Nair (Personnel Dept.)
P. Ramakrishnan (Plant No. 3)

We said farewell to . . .

E. J. Rozario, Supervisor, Tool Room
G. D. Rozario, Operator, Wire Mill

They were married . . .

K. T. Rao, Stenographer, with Miss Sakuntala.
E. Gainneos, Chargeman, with Miss Roseline.
A. M. Mathew, Wire Mill, with Miss Leelamma.
P. M. Joseph, Gl. Supdt. (Works), with Miss Alice.
P. Rajan, Asst. Engr. (Tech.), with Miss Radha.
P. M. Markose, Rod Mill, with Miss Ponnamma.
Rajan Philip, Rod Mill, with Miss Thankamma.
Y. Pappachen, Reel Shop, with Miss Marykutty.
P. Viswanathan, Reel Shop, with Miss Devaki.
N. Sivaraman, Inspn., with Miss Sumathy.
M. P. Aravindakshan, Constrn. Foreman, with Miss Rajeswari.

Births . . .

T. V. Ramachandran— a daughter ; **T. N. R. Menon**—a son ; **A. R. Gopalan Nair**—a daughter ; **V. Gregory**—a daughter ; **Abraham P. Jacob**—a son ; **M. Yohannan Panicker**—a daughter ; **M. A. Mathew**—a son, and **S. Shahul Hameed**—a son.

K. N. Sankaran Kutty
Susheela Devi

Hirakud Notes

We said welcome to . . .

Narendra Mekap, *Trainee*, Wire Mill ; Gyanendra Narayan Misra, *Trainee*, Mechanical ; B. Gopinathan Nair, *Jr. Stenographer* ; T. Krishnaswamy, *Clerk*, Accounts ; Sarat Chandra Das, *Trainee*, Electrical ; Radhakanta Patel, *Trainee*, Wire Mill ; Braja Bandhu Misra, *Trainee*, Rod Mill ; Braja Bandhu Das, *Trainee*, Mechanical ; Pitabas Bhoi, *Inplant Trainee*, Mechanical ; Nilamani Patnaik, *Helper*, Housekeeping ; Gandarba Charan Das, *Inplant Trainee*, Mechanical ; Dhirendranath Kuar, *Inplant Trainee*, Mechanical ; Sachinath Moharana, *Inplant Trainee*, Rod Mill ; Nab Kishore Patra, *Inplant Trainee*, Wire Mill ; Arjun Charan Naik, *Trainee*, Rod Mill ; M. Velappan Pillai, *Clerk*, Stores ; Bhakthaprasad Gardia, *Helper*, Moving & Handling ; T. Rajagopalan Nair, *Trainee*, Electrical ; M. K. Mani, *Assistant Engineer* ; K. Kesava Pillai, *Helper*, Rod Mill ; M. M. Mathew, *Jr. Clerk*, Stores ; G. Radhakrishna Pillai, *Clerk*, Sales ; G. Balakrishnan Nair, *Trainee* ; V. Radhakrishnan, *Trainee*, Mechanical, and Suresh Chandra Naik, *Trainee*, Wire Mill.

They were married . . .

N. S. Menon, Assistant Accountant, with Miss Ammini.

K. N. Sankarankutty Nair, Foreman, Inspection and Testing, with Miss Susheela.

K. C. Mohanty, Machinist, with Miss Soubagya Lakshmi.

R. C. Jena, Operator, Wire Mill, with Miss Malti.

Tahali Sahoo, Operator, Lift Truck, with Miss Lata.

We bade farewell to . . .

T. K. Iype, Operator, Die Shop ; **G. Gangadharan Nair,** Probationer ; **K. Radhakrishnan Nair,** Trainee ; **Joseph Zachariah,** Asst. Storekeeper (*On deputation*) ; **C. G. Krishnankutty Nair,** Operator, Rod Mill (*On deputation*) ; **Linga Raj Panda,** Trainee, Wire Mill ; **Gandarba Behera,** Welder Mechanical ; **Karan Gassi,** Sweeper (*On probation*) ; **Ramapati Parmanic,** Trainee ; **R. Madhusoodanan Nair,** Operator (*On deputation*) ; and **Alla Bux,** Guard (*On probation*).

They were welcome . . .

Mr. K. R. P. Aiyangar, Chairman, Tariff Commission, Bombay ; **Mr. K. K. Nambiar,** Chief Engineer, Concrete Association of India, Bombay ; **Mr. D. P. Tripathi,** Labour Commissioner-*cum*-Chief Inspector of Factories, Orissa, Cuttack—("*Very interesting. Quite well impressed.*") **Mr. S. C. Jain,** Indian Aluminium Co. Ltd., Calcutta ; **Mr. Rajendra Narayan Singh Deo,** formerly Finance and Industries Minister, Orissa. ("*Very interesting. There is scope for expansion and I hope this will work to its full capacity in the near future.*") **Mr. R. L. Narayanan,** Retd. Chief Engineer, Electricity, Orissa ; **Mr. Donald K. Faris,** UNICEF, Delhi ; **Mr. A. G. Bhattacharyya,** Deputy Secretary P. & C. (CD), Orissa ; **Mr. C. J. Shah,** Dev. Officer, Ministry of C. & I., New Delhi ; **Mr. S. N. Mishra,** Dy. Minister (Planning), Govt. of India; **Mr. R. Sambasivan**, Superintending Engineer (Elec.), Bhilai Steel Project. ("*A very well laid-out and neat factory. Such factories show that 'India can do it' given the chance. Wish it continued prosperity.*") **Mr. Sumant C. Misra,** Indian Aluminium Co. Ltd., Calcutta.

Tahali Sahoo and his bride Lata

Supervisory Study Group

In the centre is Mr. A. G. Menon, Chief Secretary to the Kerala Government. On either side are B. V. D. Menon and V. G. G. Nayar

Date.	*Speaker.*	*Subject.*
January 19 ...	S. N. Nair	Manufacture of High Tensile Galvanised Steel wire (with particular reference to the training he received in Japan).
February 1 ...	Mr. Roland Smith of ICI Ltd. ...	I. C. I. and its organisation.
February 14 ...	Mr. A. G. Menon, I.A.S., Chief Secretary to Government of Kerala.	Human relations in Administration. It was a dinner meeting, being the Fifth Annual Day. B. V. D. Menon introduced the speaker.
March ...	P. A. Ibrahim	On his training in the United States in personnel management.
April 6 ...	K. Seetharaman	Corrosion and its prevention (At home to M. K. Varughese who was proceeding to Hyderabad).
April 19 ...	R. Parthasarathy	"Advertising Abroad"—with special reference to his assignment at Synergie, Paris.

Suggestion Awards

To all these members of the Alind family who have had such rewarding brain-waves, our warmest congratulations. To the others may we suggest that they keep on suggesting, for who knows, one of these days they might not pull off one of those sure fire things?

N. Sadanandan ... ... Rs. 25
No. 475 ... (i) (*Repairs to damaged casting wheel by filling in the holes with copper.*)
(ii) (*Arrangement to operate pony motor of casting wheel regulator by flexible shaft.*)

K. K. Thomas ... ... Rs. 10
No. 516 ... (*Construction of pigeon holes to reduce the nuisance caused by pigeons.*)

G. Vincent ... ... Rs. 10
No. 517 ... (*Methods to check quantitative mistakes in wire drawing production.*)

P. Rajagopal ... ... Rs. 25
No. 519 ... (*Sealed ball bearings for guide pulleys in compounding machine*).

P. Narayana Pillai ... ... Rs. 10
No. 533 ... (*New gate at the boat basin to check the entrance of floating materials.*)

P. Narayana Pillai ... ... Rs. 20
No. 534 ... (*Use of reverse side of present punching cards to economise on consumption.*)

S. Gopalakrishnan Nair ... ... Rs. 25
No. 535 ... (*Provision of a guide roller behind the three rollers in wire drawing machine, so as to maintain correct position of the rod enabling thereby prevention of breakage to rods and minimising wear and tear on gears.*)

Number of Suggestions received so far	546
Amount disbursed so far	Rs. 6,980

Efficient employee

Asked about his ambition in life, G. THOMAS, Junior Operator, Wire Mill, who came to us back in 1950 said that he would strive his best to be described as 'Alind's Best Employee'. Indeed, he is one of our very good workers, having annexed on various occasions Merit Certificates and Efficiency Awards. In 1959-60 he received an 'A' Award.

Gardening is his chief off-work interest, Kesava Dev his favourite author, football his favourite game, and MGR his most-liked movie idol.

* * *

Employee who fulfilled his probation promise

Another consistent award winner is P. M. VARGHESE PANICKER, Thomas's colleague in the Wire Mill. He joined Alind in 1955. Production Certificates, Merit Certificates, Attendance Awards, Efficiency Awards have all come his way too. In fact, he was a marked man after he had served his probation—he had been marked excellent! Gardening and small-scale farming are his other interests. In cross-country and volleyball, Panicker is particularly good.

He has three big "nils" respectively for his 'sports activities', 'other interests' and 'hobbies', but for 'his favourite game' his answer is 'cards'.

* * *

Shakespeare scholar

N. MADHAVAN NAIR, Junior Operator, Rod Mill, is an Intermediate-in-arts of the Kerala University (1950). He came to Alind in 1955. His performance in the plant has consistently been good and for the official year 1955-60 he received an Efficiency Award 'A'. Volleyball, badminton and table tennis are his principal sporting interests. In his spare moments, he reads Shakespeare. And his maxim in life apparently is: 'Beware of entrance to a quarrel; but, being in, bear't that the opposed may beware of thee', for according to an autobiographical tit-bit furnished by him he likes to avoid quarrels on and off the works.

Silent worker

J. K. LOUIS, Guard, Security, is a most vigilant man, indeed. Somebody once tried to pull a fast one on him, but Louis smartly outwitted him. Tactful and diligent, he is yet another Efficiency Award winner.

An event which affected him deeply is Gandhiji's assassination. Historical fiction, historical films, farming and gardening are all his leisure pleasures.

* * *

Good guard

'A consistently good worker', 'a silent worker'—these phrases have been used to describe K. VASU, Junior Operator, Wire Mill, by friends who know him. He came to our Company in 1955. His ambition in life is to see that his children—at present, two—are well-educated and well-placed in life. Humorous novels and film comedies are what he likes most.

* * *

Musician and actor

P. N. GOPALAN, Clerk, Inspection and Testing, Plant No. 2, Hirakud joined Alind in 1957. Before that, he had served for two years as a Time-keeper with Hirakud Dam Project. In the four years that he has been with us, he has worked practically in all the sections, such as General Office, Stores, Personnel and Accounts.

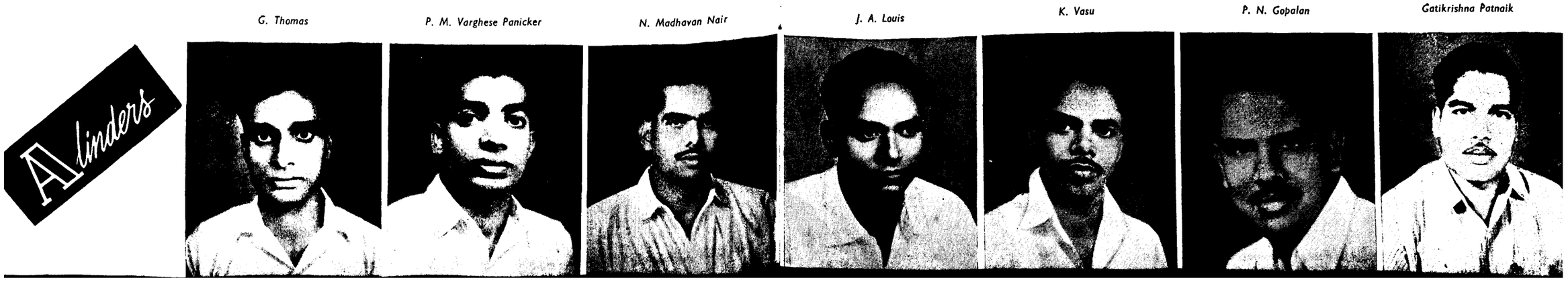
Music and histrionics are his favourite leisure-time pursuits. He can strum a *bhul-bhul tarang* to good effect. In volleyball and fancy dress, he has secured prizes.

* * *

Swimmer

GATIKRISHNA PATNAIK, Electrician, Electrical Section, Plant No. 2, Hirakud, is another personality whom we would like to present to CHRONICLE readers. He came to us in 1957. He is a Matriculate from Utkal University.

Interested in doing social work, he is quite a popular person off the factory as much as on it. Football is his favourite game. He is also very fond of swimming.



SAFETY WEEK

"A personal injury occurs only as the result of an accident; an accident occurs as a result of a personal factor or mechanical hazard existing only because of personal faults.

Personal faults are either inherited or acquired by environment. From this sequence, if the unsafe act or mechanical hazard is eliminated, the accident that can happen will not cause any injury. This is the basic philosophy of accident prevention."

So summarised Dr. T. Bhaskara Menon, Director of Health Services, Kerala Government, inaugurating Alind's Safety Week of the year on April 17.

V. G. G. Nayar was in the chair and Dr. Sivaraman Nair, company medical officer, welcomed the large gathering present.

First, a two-minute silence was observed in memory of Gopalakrishnan Nair, Operator, Wire-Mill, who had met with his death in an unfortunate accident some three years ago.

Mr. G. Sadasivan Nair, company legal adviser, another guest speaker, declared that carelessness caused most accidents.

Other speakers were V. Hariharan, Plant Superintendent, and Mr. Madhavan Pillai, Labour Officer, Kundara. The latter speaker said: "When accidents occur, do not blame them on Fate. Rather, work out schemes for preventing a recurrence."

Talks: A five-minute Safety Talk was given by Supervisors/Foremen/Chargemen to shift crews in each shift on three days.

Film Shows: During the week, screenings of Safety Films were arranged. All the shifts were covered.

A fire-fighting demonstration and a first-aid demonstration were other highlights of the week.

In the Safety Slogan Contest, winning entries were submitted by P. Sivasankaran Nair, Planning, P. Sivasankaran Nair, Payroll, and K. K. Velayudhan, Supervisor, Plant No. III.

Valedictory Meeting: Mr. A. Kunjukrishna Pillai, Labour Commissioner, was in the chair. V. O. Mathew, Personnel Officer, welcomed the gathering.

Mr. Pillai stated in his address that in the Indian Labour Conference of 1961, "Accident Prevention" was the topic most discussed and that Kerala had the lowest accident figures. He also commended Alind's safety consciousness.

Madhavan, Assistant Personnel Superintendent, drew on a wealth of statistical data to emphasize the need for drawing up an accident prevention programme.

(Contd. on next page)

SAFETY WEEK THULLAL

Our Japanese technicians don their dhoties! From left to right are Matsumoto, T. Kato, T. Koyama and T. Nakayama. At extreme right is Safety Officer G. K. Warrior who wrote the script of the piece. Next to him is S. N. Nair, Project Engineer, Steel Plant

(Contd. from previous page)

G. K. Warrior, Safety Officer—and to whom largely the credit for the successful staging of the Safety Week should go—proposed a vote of thanks.

An *ottam thullal*—the theme of which was an accident-free scheme of things—climaxed the valedictory function. Warrior wrote the script of this lively piece. And so well-received it was that we said, *Encore!*

INSTITUTION OF ENGINEERS (INDIA)

Paper Centre formed at Kundara

A "PAPER CENTRE" OF THE INSTITUTION of Engineers (India) has now been established at Kundara—thanks to the initiative of Alind's youthful engineers and the enthusiastic support given to the project by older members of the profession, in and around Quilon.

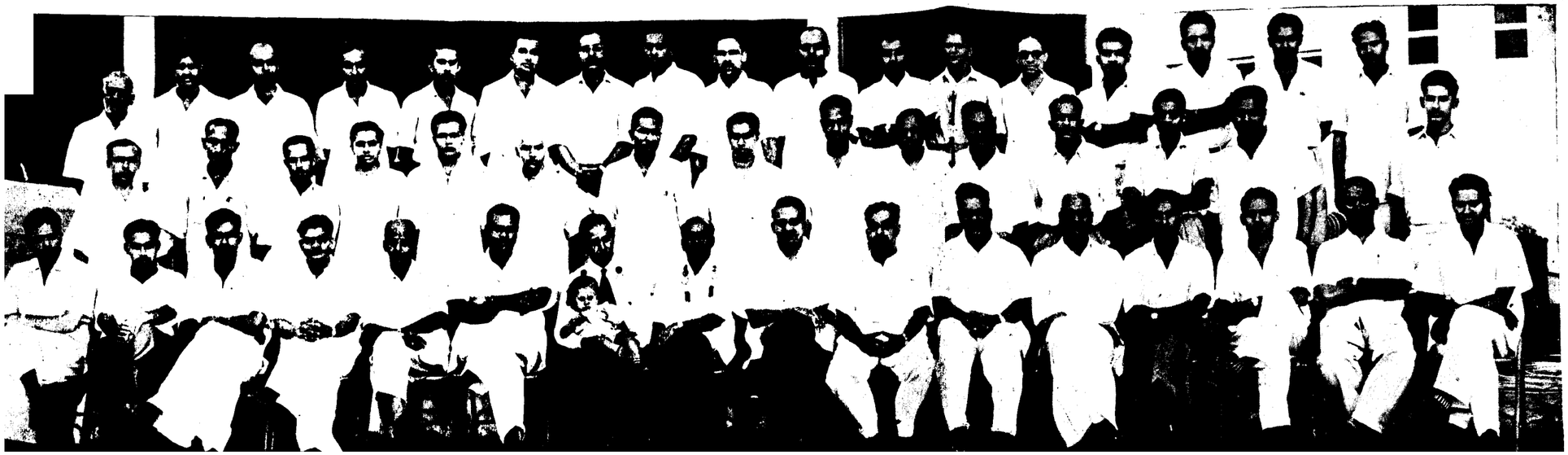
At the inaugural meeting of the Centre, held at Kundara on April 27, Mr. C. S. Padmanabha Iyer, Chairman, Kerala Centre, presided.

V. G. G. Nayar was unanimously elected Chairman, and V. Hariharan, Plant Superintendent, Hon. Secretary of the new centre.

On May 19, Mr. K. Janardhanan Pillai, Executive Engineer, Public Health Engineering Department, Quilon, presented a paper on "An Introduction to Public Health Engineering". It was a most interesting thesis, well-documented and ably presented.

Mr. T. Balakrishna Menon, Chief Engineer, presided.

Winding up the discussions, Mr. Menon said: "We are indeed fortunate in living in an era of great challenges and great possibilities of achievement, not given to any previous periods of history. History is now being made at a far faster speed than ever before. If we are willing to make the effort, we can help history. A faith in the greatness of our enterprise and a desire to help human welfare must wake us up."



Farewell to E. J. Rozario, Tool Room, and welcome to P. A. Ibrahim on his return from his U. S. tour

ALIND RECREATION CLUB CELEBRATES TENTH ANNIVERSARY

ON JANUARY 26, THE NATION'S Republic Day, ALIND RECREATION CLUB celebrated its Tenth Club Day with Mr. R. V. Ramani, Director, Seshasayee Bros. Private Limited as the chief guest.

In the morning, following the solemn ceremony of flag-hoisting by V. G. G. Nayar, General Manager, sweets were distributed to the assembled children.

The Club Day function got under way in the afternoon with a warm welcome speech by S. Peer Mohammed, Sales Manager.

M. Philip, Hon. Secretary, then presented the Annual Report for the period ending Dec. 31.

Highlights were:

(i) Receipts during the year including the balance brought forward came to Rs. 10,946.96. Expenditure was Rs. 4,150.16.

Mr. R. V. Ramani, chief guest

A tense moment from Duck the golden egg, the Club Annual Dinner Day

The cast of the play

Another moment from the same play

Mr. S. C. S. Menon, President, FACT Employees' Association, who said a few good things about Alind's progressive personnel policy

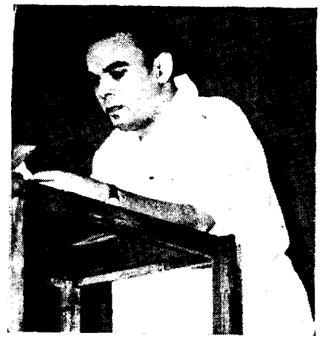
(ii) The Club's Football Team continued to stay in the limelight by annexing for the fourth time in succession the Janis Spink Cup of the Quilon District Football Tournament. K. K. Madhavan Nair and Sadasivan Paniker deserved special mention for this year's victory. Three of our League players, Zachariah, Madhavan Nair and Cherian were selected to represent the District in the Inter-district Football Tournament held at Cannanore. Three of our players Madhavan Nair, Indrapalan and P. A. George were also selected to represent the State in the Santosh Trophy Tournament.

(iii) For the first time our Badminton Doubles and Fives teams participated in public tournaments. The Doubles team was the winner in the GKS Sports Club Tournament and the Fives team the runners-up in the Tournament conducted by the Paravoor Sports Club.

(iv) A Cricket practice pitch was inaugurated by Director B. V. D. Menon on March 10.

(v) Two of our junior table tennis players, Thomas Varghese and M. V. Chacko were the finalists in the tournament conducted by the CYMS Quilon, Chacko winning the first place.

(vi) A milk bar started functioning with Alind Mess (Dormitories) as the caterers from October 23, 1960 onwards.



M. Philip presents the Annual Report

Mr. Ramani said: "To-day is your Tenth Club Day. It is also India's Tenth Republic Day. On this occasion, we should recall—sit back and take stock of what we have achieved. We have really done great things, but the sad fact remains that at the present rate of increase in population we would be left in 1975 with the same *per capita* income we had in 1960. For developing the economy of the country, a basic engineering approach to problems might be a great help."

Other speakers at the function were Mr. D. C. Kizhakkemuri, General Manager, National Book Stall, Kottayam, and Mr. S. C. S. Menon, President, FACT Employees' Association, and T. V. Ramachandran.

The former deplored, in the course of an interesting address, the deteriorating quality of present-day writing. Mr. Menon said that industrial peace during the Third Plan period could be maintained if management would take workers into complete confidence.

Mr. M. N. Vasudevan Nair proposed a vote of thanks.

A fitting finale to the day's function was the play staged after dinner—*Duck the golden egg*. Reinforced with imported feminine talent, the cast included practically all our stars. And the play itself contained some tense situations, affording ample scope to our amateurs to rise to great histrionic heights.

M. N. Vasudevan Nair who proposed a vote of thanks

T. V. Ramachandran —a speaker at the function

FACTORY DAY
AT HIRAKUD

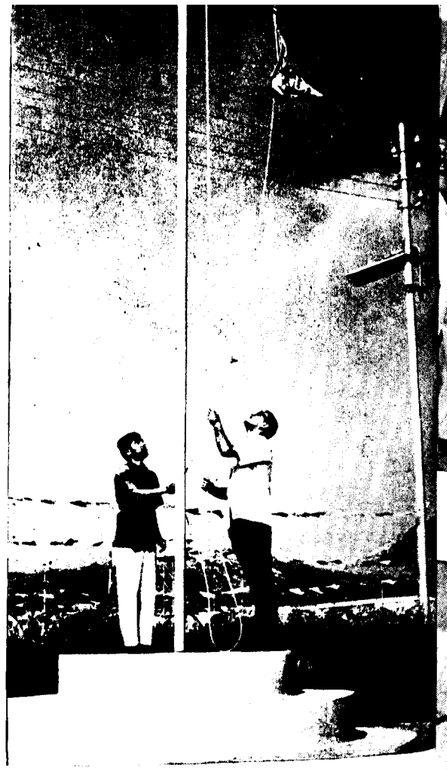
On March 19 and 20, personnel at Plant No. 2, Hirakud, celebrated in a fitting manner their "Factory Day." A heart-warming function, our men and their families thoroughly enjoyed this event.

On the first day at 8-30 a.m., Director B. V. D. Menon unfurled the Alind flag. This necessarily brief, but solemn, function was followed by sports.

There was a "social" in the evening at which Alinders and members of their families were present.

Prizes were given away by Mr. Menon.

On the second day, two plays were staged – one in Malayalam, *Podikkai*, and the other in Oriya, *Jhara Baula*. The Oriya play included in its cast two talented artistes from neighbouring Cuttack—Miss Rita Palit and Miss Sarojini Mohapatra. Both plays were great successes.



Up goes the Alind flag as Director B. V. D. Menon pulls a fast one!

The actors and actresses who took part in the Oriya play with Director B.V.D. Menon (fourth from left) V. G. G. Nayar, (third) and R. K. Nair (fifth.)

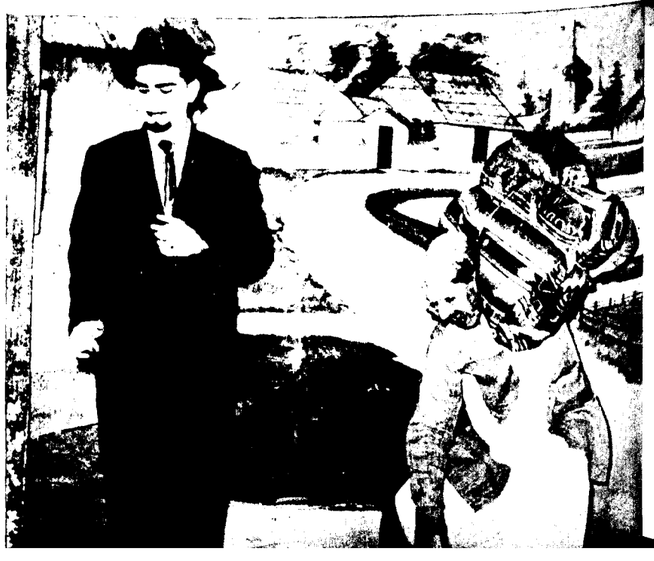
SCENES FROM PODIKKAI

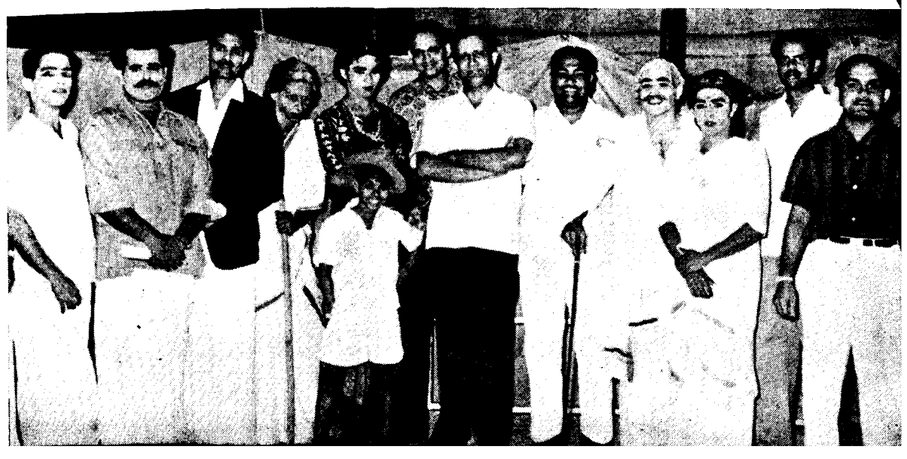
B. S. Sahini and Miss Rita Palit in Jhara Baula

N. B. K. Pillai and K. N. S. Nair

B. G. Nair, K. N. S. Nair and K. C. Mathew

Scene from Jhara Baula, the Oriya play staged at Hirakud
At bottom left are G. P. Kar and Miss Rita Palit
At right are B. K. Mallick and G. C. Misra





Those who took part in the Malayalam play with Director B. V. D. Menon, V. G G. Nayar and R. K. Nair

HIRAKUD FACTORY DAY
TOURNAMENTS & SPORTS 1961

LIST OF PRIZE-WINNERS

Pole Vault : (i) D. N. Kuar, (ii) C. G. K. Nair, (iii) B. G. Nair

Badminton (Shuttle-cock) (*Singles*)
Winner
K. N. G. Nair.
Runner-up
N. Gopalakrishnan Nair.

Badminton (Shuttle-cock) (*Doubles*):
Winners
M. V. G. Menon and N. Gopalakrishnan Nair.
Runners-up
K. N. S. Nair and K. R. O. Nair.

Tennikoit (*Singles*)
Winner
K. N. G. Nair.
Runner-up
C. G. Krishnankutty Nair.

Tennikoit (*Doubles*)
Winners
K. N. G. Nair and K. C. Mathews.
Runners-up
K. N. S. Nair and N. Satheesa Menon.

Table Tennis (*Singles*)
Winner
M. K. Mani.
Runner-up
K. R. O. Nair.

Table Tennis (*Doubles*)
Winners—
K. N. S. Nair and B. G. Nair.
Runners-up—
K. R. O. Nair and Tahali Sahoo.

Javelin Throw : (i) G. N. Misra, (ii) C. G. K. Nair, (iii) D. N. Kuar

Champion C. G. K. Nair obliges our cameraman, but modesty possibly prevents him from giving our readers that big, winning grin !

Caroms (*Singles*)
Winner—
N. Gopalakrishnan Nair.
Runner-up—
K. N. G. Nair.

Caroms (*Doubles*)
Winners—
K. Prabhakaran Pillai and K. C. Mohanty.
Runners-up—
N. Gopalakrishnan Nair and R. R. K. Nair.

Volleyball (*Sectional*)
Winners—
(Maintenance, Shipping and Inspection and Testing.)
K. C. Mohanty ; G. N. Misra ; D. N. Kaun ; K. N. S. Nair ; K. C. Mathews ; V. Muralidharan Pillai ; Loknath Dey ; and B. V. R. Murthy.
Runners-up—
(General Office and Security).
K. N. G. Nair ; B. G. Nair ; N. Gopalakrishnan Nair ; R. R. K. Nair ; K. Aravindakshan ; M. Velappan Pillai ; N. Balakrishna Pillai ; and T. Krishnaswamy.

Kabadi (*Sectional*)
Winners—
(Maintenance, Shipping and Inspection and Testing)
K. C. Mohanty ; Ramoo ; John ; Lokanath Dey ; D. N. Kaun ; G. N. Misra ; V. Muralidharan Pillai ; K. C. Mathews ; and K. N. S. Nair.
Runners-up—
(Wire Mill)
K. S. Panda ; G. Ranbadia ; S. C. Naik ; G. P. Kar ; S. C. Patnaik ; B. C. Lenka ; Anand Minz ; R. K. Patel ; and N. N. Mohanty.

Tug-of-War (*Sectional*)
Winners—
(General Office)
N. Satheesa Menon (Capt.) ; N. Gopalakrishnan Nair ; K. N. G. Nair ; M. V. G. Menon ; J. Dani ; Joseph Zachariah ; M. Velappan Pillai ; and R. R. K. Nair.
Runners-up—
(Rod Mill)
B. K. Mallick (Capt.) ; S. B. Sabath ; T. N. Sadanandan ; T. S. Swain ; Sunakar Mati ; N. N. Biswal ; S. N. Biswal ; and N. Gopala Kurup.

100 Meters Dash
C. G. Krishnankutty Nair—I.
D. N. Kaun—II.

Long Jump
G. N. Misra—I.
C. G. Krishnankutty Nair—II.

High Jump
C. G. Krishnankutty Nair—I.
Koshy Luke—II.

Pole Vault
D. N. Kaun—I.
C. G. Krishnankutty Nair—II.

Hop, Step and Jump
G. N. Misra—I.
C. G. Krishnankutty Nair—II.

Putting the Shot
C. G. Krishnankutty Nair—I.
G. N. Misra—II.

Discuss Throw
K. C. Mohanty—I.
G. N. Misra—II.

Javelin Throw
G. N. Misra—I.
C. G. Krishnankutty Nair—II.

Sack Race
C. G. Krishnankutty Nair—I.
K. C. Mathews—II.

Sack Melie
Joseph Zachariah—I.
C. G. Krishnankutty Nair—II.

Cross Country
K. C. Mathews—I B. G. Nair—II
Anand Minz—III.
Consolation Prizes—
Habeeb Khan and M. K. Mani.

Three-legged Race
K. C. Mathews and V. Muralidharan Pillai—I.
Anand Minz and P. C. Prushti—II.

Obstacle Race
K. C. Mathews—I.
V. Muralidharan Pillai—II.

Pillow Fight
N. N. Biswal—I.
K. C. Mohanty—II.

Climbing the Greased Pole
G. N. Misra and V. Muralidharan Pillai—I.

Slow Cycle Race
K. C. Mohanty—I.
D. N. Kaun—II.

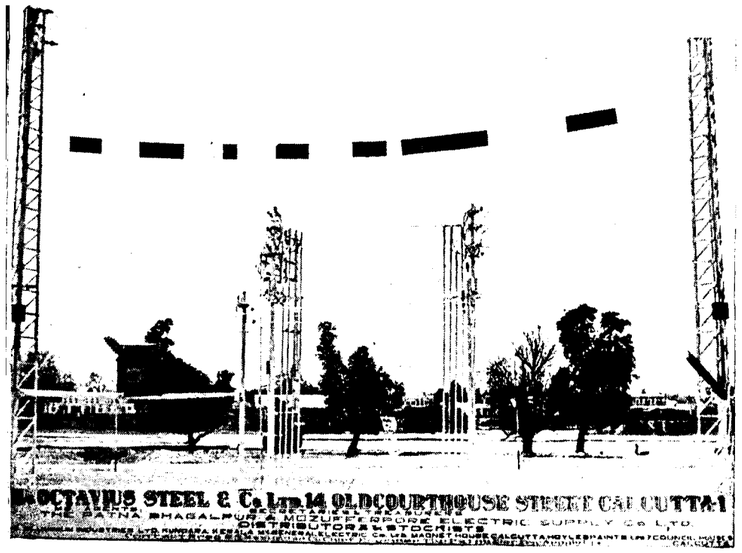
Fancy Dress
Banshidhar Sahoo and D. N. Kaun—I.

Cross-country event : K. C. Mathew receives his first prize

High Jump : (i) C. G. K. Nair, (ii) Koshy Luke, (iii) G. N. Misra

Tug-of-War The office team who won the event

Best All-rounder G. N. Misra gets his cup from Director B. V. D. Menon



At Muzafferpore . . .

At Pandalam . . .

ALL'S FAIR!

At Madras . . .
Mr. K. Kamaraj, Chief Minister, Madras State, is in the foreground

In recent months, Alind participated either directly or indirectly in three exhibitions—in three different places—at Pandalam, Madras and Muzafferpore.

At Pandalam, we put up a modest, if impressive enough, show on our own. This exhibition had been laid on by friends and admirers of Mannath Padmanabhan as an integral part of the celebrations organised in connection with his eighty-fifth birthday.

The show at Madras was got up by our distributors, Allied Industrial Distributors Limited. The occasion was the Golden Jubilee celebration of the Southern India Chamber of Commerce, a significant item of the programme being a grand exhibition at Island Grounds, Madras.

Octavius Steel & Co., Limited, our Bengal and Orissa dealers for covered aluminium conductors, did a fine job of practical promotional work for our products by their participation in the Muzafferpore exhibition.

ALUMINARIES (6)

N. Satyanathan

Secretary

N. SATYANATHAN IS A LATE COMER . . . to Alind. Indeed, he joined us as recently as 1958, but ever since he came, we have been in clover (judging by the feeling of it) that we really do not know how we had been getting along all these years without him. Like so many of our other employees, he too came to us from FACT. His previous experience included besides a brief stint with Hindustan Insecticides, Alwaye, as Accounts Officer.

Satyanathan has had a brilliant academic career. It was with him one long and unbroken innings of first classes. His original ambition was to prepare himself for an engineering career, but this foundered on the admission barrier, notwithstanding his very high marks in the Intermediate Examination. However, after he took his B.Sc. degree, he did get an offer of admission at one of our older universities, but " Barkis " was not willin' !

Satyanathan accepted an appointment with FACT because he believed that this new giant chemical enterprise would afford him an opportunity to fulfil his original technical aspirations. But by one of those quirks of Fate he found himself in a sea of FACT's figures—in the company's Accounting Department.

Figures are such fascinating things —even the arithmetical variety—that Satyanathan soon not only jettisoned his technical dream, but started swotting up for the highly specialised accountancy exams. When the opportunity for absorption in the technical *cadre* did come his way, it rather left him cold—he was no longer interested.

Satyanathan joined Alind first as an Additional Accountant. Since January 1 1960, he has been company secretary. His work has been so good that our chairman drew pointed attention to it in his last address to the shareholders.

Reading is his principal leisure-time pursuit. All kinds of books interest him—literature, philosophy, religion, travel and fiction. His one consuming passion is Carnatic music. An expert musicologist, it is a rare treat to listen to him expounding the *nuances* of Saint Thiagaraja's compositions. He is himself gifted with a melodious voice.

What has endeared Satyanathan to a host of friends and admirers is his extremely unassuming nature. He has many things to be proud of, yet he can keep a head on his shoulders.

Mathematical, methodical, musical and modest, N. Satyanathan is that rare, rare Secretary !

—*R. P.*

Personnel Management and Human Relations in Industry

Training in the United States

By P. A. IBRAHIM

WAS AMONG FIFTY CANDIDATES selected in 1960 by the National Productivity Council, New Delhi, for training in subjects of industrial productivity in the United States under the auspices of Technical Co-operation Mission.

The pre-departure formalities and orientation of the participants were completed on September 7, 1960 at New Delhi. Mr. K. S. Levick of TCM in India and Mr. Prasad, Training Officer of the National Productivity Council met the trainees at TCM's Office, Faridkot House, and at NPC, 38, Golf Links, New Delhi.

Leaving Palam Airport at 11-50 p.m. on Sept. 7, I arrived at New York on Sept. 9, at 3-30 p.m. touching Beirut, Zurich and London. *en route.*

On September 10, I reported at the Office of the International Co-operation Administration, 815 Connecticut Avenue, Washington.

The training programme comprised :

(i) Orientation at International Centre, Sight-seeing and visits ; (ii) Formal course of study in a University ; (iii) Practical visitations ; (iv) Participation in a seminar on communication ; (v) and Evaluation by ICA.

(i) Orientation

Lectures covering American History, Customs, Social Security, Religion, etc., were arranged at the International Centre and at the Hotel.

(ii) Formal Course of Study

Those participants who were granted admission in universities were to undergo a course of study in the relevant subjects for one to two semesters. I was enrolled as a student at Cornell University in Ithaca, New York. Cornell is a private university and ranks as one among the five best universities in the States Yale, Harvard, California and Princeton being the others. The Cornell University and campus lie on a lovely hill overlooking Lake Cayungar, one of the well-known " finger " lakes in the State.

The Graduate School of Business and Public Administration provides facilities for the study of a variety of subjects besides " Personnel Management and Human Relations in Industry ". I selected three subjects at this school and attended lectures and seminars covering these three subjects at the New York State School of Industrial and Labour Relations, a unit of the New York State University, placed at Cornell. Since my training period was six months, I was to attend only one semester—the Fall semester—at Cornell. The Project Implementation Order issued to ICA participants did not stipulate attendance in courses for credit. However, in order to take full advantage of the opportunity offered, I voluntarily opted for credit hours in the subjects selected at the Business Administration School. This meant regular attendance at School, participation in home work and mid-term and final examinations apart from having

P. A. Ibrahim

to subject myself to final grading along with the regular students. The course in Personnel Management and Human Relations covered all aspects of personnel administration. The courses, Management Survey, Collective Bargaining, Wages and Salary Administration and Training Programmes in Industry were much more specialised studies.

Although the requirement of a Master's Degree in the above subjects is attendance for three semesters, all for credit hours, I was lucky to be graded along with the regular students, despite my attendance of only one semester of credit hours. I secured 90 per cent marks in the examinations and my final grade was among the top 15 per cent of a class of 90 graduate students.

With a student population of over 11,000, which is one-third of the population of Ithaca—the town—the University campus is a self-sufficient unit, with a number of cafeterias, swimming pools, libraries, post offices and banks.

The " Willard Straight "—a prominent hall in the campus—is the hub of all activity. It houses a big diner and a cafeteria where thousand students can eat at a time. It also houses the TV hall, an entertainment hall, a theatre, and other amenities.

To a student seeking a degree or a doctorate, a choice of subjects is available in each faculty. At the Graduate School of Business and Public Administration, a Master's Degree in Business Administration is awarded on the completion of three semesters. The discussions in class-rooms, the assignments, the mid-term and the final examinations keep the students constantly busy. Gruelling work is called for, as otherwise one will not be able to cope up with the curriculum. On the results of the written examinations and on the performance in the class, the students are graded, those securing about 90 per cent being placed in the top grade.

The system of grouping all students under a professor adviser helps the students, especially foreign students, solve their various problems. The adviser will be free for counselling service on all days in the week.

A student directory furnishes details about each student. The professors, their assistants, secretaries and office staff will always be available for necessary guidance and help.

After lectures on various subjects, students are asked to come prepared for discussions and to express their views. Stress is laid on the case method of instruction and role-playing. Periodically, experts on various subjects are invited from outside to talk to the students during class-hours.

Among democratic student bodies devoted to cultural activities at Cornell are such units as the Foreign Students office, the Cornell United Religious Work, and the Cornell Pan-Hellenic Inter-Sorority Councils.

The International Week-end Programmes are most interesting events. American boys and girls and foreign students freely mix and enjoy discussions, share in music and merry-making. Other interesting activities are the Supper Club Meetings and the Foreign Students Reception arranged by the Inter-Sorority Council.

While at Cornell, I often enjoyed the hospitality of American families who invited me for lunch or for dinner, for coffee-hour discussions, for automobile rides to the countryside, for church services and church meetings.

I would like to place on record my special thanks to Mr. Stuart Sheppard, Dean of the Faculty of Business and Personnel Administration at Cornell, Mr. Earl Brooks, Professor, and Mr. and Mrs. Claude F. Bennett.

Practical Visitations

International Business Machines Corporation, New York. This is an organisation which employs about 94,000 men and women in the U.S. and abroad. The Endicott plant employs around 9,000 people. Electric typewriters, electronic computors, comptometers and data processing machines are the products. The General Products Division of the plant at Endicott has an elaborate training system for both their own employees and those of their customers. Endicott is the world's largest producer of high-speed output printing devices for data processing systems. The employees are not unionized.

Eastman Kodak, Rochester : The Kodak Park Works where photographic materials are produced employs about 20,000 peoples. One central kitchen caters to 17 cafeterias. Parking facilities are afforded. Employees are not unionized.

Nichols Wire and Aluminum Co., Davenport—Iowa : I spent five days studying personnel relations at the Nichols plant. This is a small unit engaged in the manufacture of aluminium sheets, nails, garden fences and building materials. Personnel relations are handled by the Foreman, Superintendent and Plant Manager, with the assistance of a Time and Motion Study Supervisor. This organisation, though small in size, has an enlightened personnel policy. A merit rating system, discipline and grievance procedure, a retirement plan to supplement income from social security—all these have been incorporated in a three-year agreement.

The Plant Manager convenes a conference once in three months and a union steward, or one employee from each department, attends the meeting. New processes, development programmes, new products, new rules of conduct, etc., are all discussed. Union representatives or shop stewards are not allowed to transact union business or to handle grievance procedure on company time. The employees in this organisation have a credit union.

I am grateful to Mr. Frank R. Nichols, President, a great friend of us all at Alind, Mr. Jim Morris Plant Manager and Mr. Bob Zimmerman, Plant Superintendent for the facilities afforded to me.

Alcoa (Davenport) Works : I spent two days with Alcoa's personnel people-with Director Beauchamp Assistant Director Mr. Vanoset and the Managers, of Employment,

Safety, Labour Relations and Security Divisions. Supervisory Training especially Pre-Foremen, and Tuition and Programmes are special features of the executive development programme of the company.

John Deere & Company, East Moline, Illinois : These people are the largest manufacturers of farm equipment. The *Combine* a new type of tractor—is produced at the rate of 80 to 100 a day.

This company has separate Personnel and Industrial Relations departments under separate Vice Presidents.

About 12,000 employees are working for the company.

South Wire Company, Carrolton, Georgia: South Wire Company is an organisation which very much resembles our own Alind. Their business is the same as ours—aluminium conductor manufacture.

South Wire employs less than 400 people.

Mr. Roy Richards, President, Mr. Roger Schoerner, Vice President and General Manager, Mr. Marvin Martin, Personnel Manager and Mr. Roubin Word, Law Officer—all took the keenest interest in my work and afforded me all opportunities and facilities. During departmental conferences, I was a special guest.

While at Carrolton—Georgia—I spent a day with Mr. John L. Peek, Representative of the Labour Department, discussing with him problems of training in industry in India.

Ajax Magnethermic Corporation, Trenton—New Jersey. This is also a small organisation but in precision work and the application of new techniques, it could be grouped with the bigger units. They are chiefly manufacturers of induction furnaces.

Mr. Manuel Tama, Vice President and Mr. G. F. Kole, Works Manager, took me round the works and explained to me various aspects of their personnel administration.

Ternstedt Division of General Motors Corporation, Trenton : This Division of G M C is known for quality in design and craftsmanship in the field of automotive hardware, accessories and parts. It has an employee strength of 5000, with a large personnel set-up under a Resident Director of Industrial Relations.

Bendix Ariation Corporation E. Moline. This organisation is engaged in the manufacture of flight equipment and aircraft accessories. It has a personnel strength of about 7000.

The American way of industrial life

(*a*) The office staff, supervisory personnel and security staff are normally not unionised.

(*b*) A very efficient system of communication prevails. Rules and regulations, company's progress, expansion schemes, changes in processes, new products—are all made known in advance.

(*c*) Job rotation *within a division* is considered very effective and often adopted.

(*d*) Relations between boss and subordinates—Supervisory staff and ranks—most cordial.

(*e*) Incentive wages never go beyond 25 to 30 per cent of basic wages.

It is true that the ordinary American has a better standard of living, as he has all modern amenities but it is often forgotten that he works hard while at work. Easy-going, pleasure-seeking people have no place in the American sun.

Seminar on Communication

Institutions and places of interest visited by me during my semester at Cornell and later during practical visitations included: The White House ; Supreme Court ; U. S. Capitol; Washington Monument; Jefferson Memorial; Lincoln Memorial; Mount Vernon; Niagara Falls ; Ithaca Falls ; Harpur College ; Princeton University; Industrial Management School, Rock Island Arsenal ; Dr. Palmer's School of Medicine ; and the Indian Embassy.

Towards the close of the training programme, a seminar on communication conducted by the Michigan University was held at Cacapon Lodge, in Cacapon State Park, Berkeley Springs—the Vacation Wonderland of West Virginia. Forty-one trainees from several countries including Greece, Turkey, Egypt, India, Brazil, Japan, Iran. Indonesia and Costa Rica participated in the seminar. It was most interesting and informative and the participants were awarded certificates by the Michigan State University.

ICA evaluation of the participants was arranged on March 1. The participants submitted detailed reports and statements about their training in the States.

I left New York on March 4, 1961 and arrived in New Delhi on March 6.

Welcome Visitors

Mr. Y. K. Kaul of Alcan Asia, Limited, Calcutta and Mr. J. E. Termuende of Western Wire & Cable Co. Vancouver

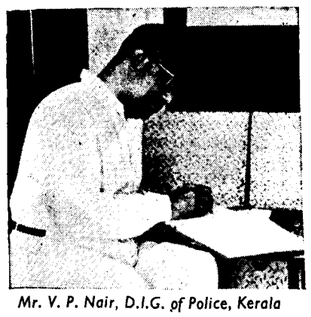
L-R: Miss K. R. Saraswati Amma, M.L.A. Mrs. Sucheta Kripalani, Minister of Industries, U.P. and Mrs. Leela Damodara Menon, M.L.A

Fourth from left is Mr. Michael Sullivan, General Manager of Aluminium Manufacturing Co. Private Ltd., Calcutta

Mr. Manushi De, the well-known artist with little Lakshmi, VGG's daughter

Mr. C. J. Shah, Dev. Officer, Metals is third from left. To his right is Mr. H. A. B. Parpia, Indl. Liaison & Extn. Officer, Delhi and to his left is Mr. M. Habibullah, Director of Industries, Kashmir. At extreme left is S. Peer Mohammed and at extreme right is M. R. G. Menon

Left to right : Mr. V. S. Sahdev, Assistant Works Manager, IAC, Hirakud, Mr. P. C. George, Chief Engineer, IAC, Calcutta, Mrs. Sahdev, Mrs. P. M. Menon, Mrs. Powell, Mr. Powell, Vice Chairman, Aluminium Limited, Mr. P. M. Menon, R. K. Nair, Dr. Harwood, Managing Director, Indaluco and Mrs. Harwood



Mr. V. P. Nair, D.I.G. of Police, Kerala

(Left) Mr. S. N. Misra, Union Deputy Minister, Planning with R. K. Nair

Mr. A. S. Kurupad, XEN, Hirakud

Why we should care about aluminium (i)

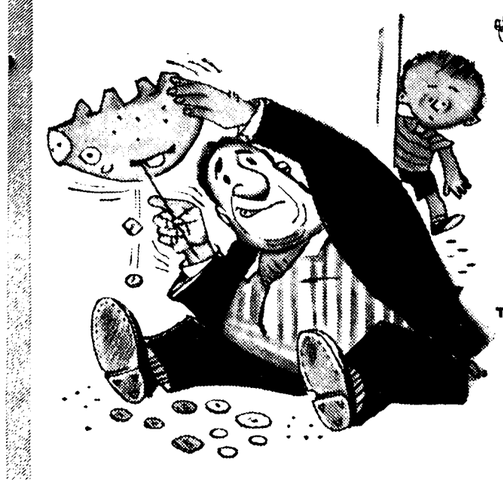
An industry as basic to the public welfare as electric supply is now compelled by circumstances to switch quickly away from a material which has to be imported from abroad (frittering away scarce foreign exchange) and which costs a pretty penny **...copper**

to a material which has much to offer in terms of technical feasibility... which is already being produced in the country... is geared to a surging expansion programme and which costs much less **...aluminium.**

EMERGENCY

Thinking about aluminium conductors is well worth the time spent on it and it may pay before long.

Anticipating the trend towards the growing acceptance of aluminium conductors, ALIND pioneered their use in this country eleven years ago.



Drop us a line, we'll reply by cable!

ALIND

THE ALUMINIUM INDUSTRIES LIMITED

India's largest manufacturers of aluminium conductors and accessories

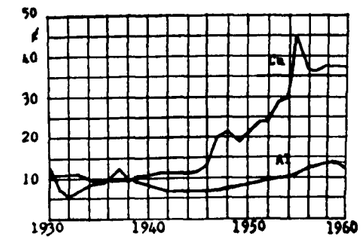
Registered Office & Plant No. 1: Kundara (Kerala)
Plant No. 2: Hirakud (Orissa)

Managing Agents:
SESHASAYEE BROS. (TRAV.) PRIVATE LIMITED

AL-667b

Why we should care about aluminium (ii)

A plot that tells a story... and points a moral too!

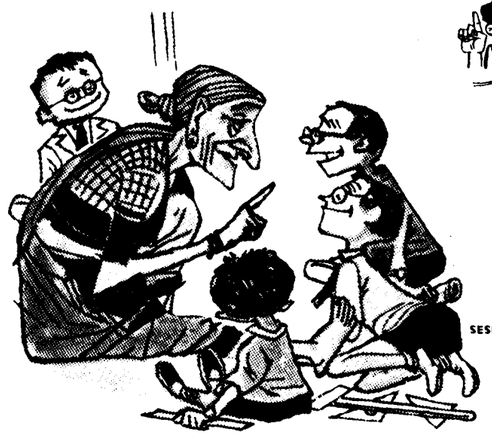


This table should make even the most conservative "swearer-by-copper" think...about aluminium!

Matching these price trends is a world-wide year-by-year mounting production of aluminium. The Third Plan target is 1,12,000 tons of aluminium.

In applying aluminium to transmission systems, distribution circuits and outdoor weather-proof and indoor installations, power engineers of the country are but demonstrating that they, too, can accept a challenge and win new spurs like engineers the world over.

Alind's integrated production facilities and its experience of well over a decade in the varied applications of aluminium as an electrical conductor are your best assurance of **quality first in the product ... service first to the customer.**



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