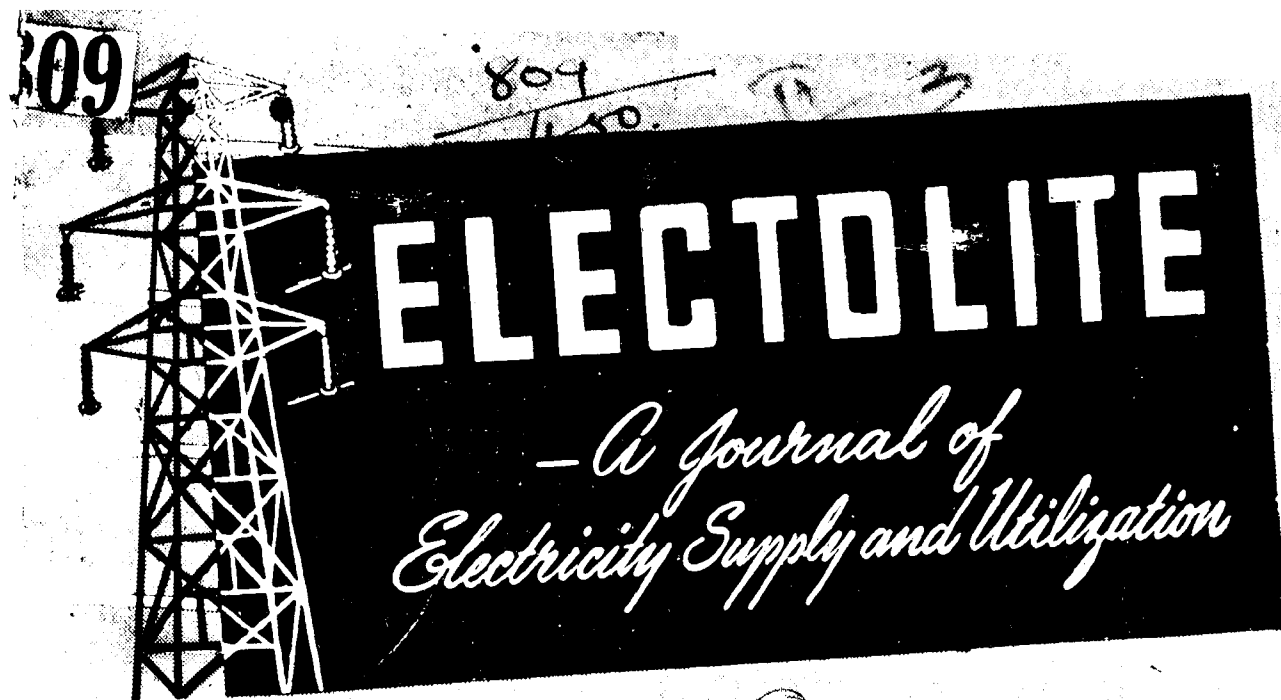


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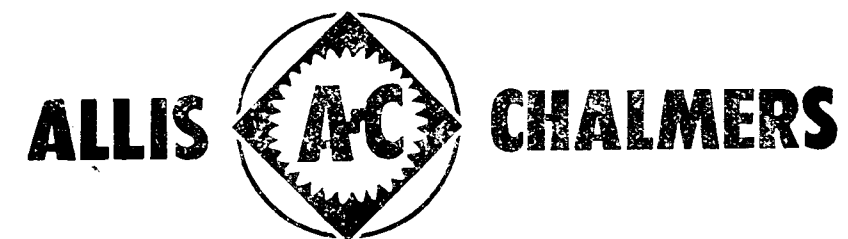
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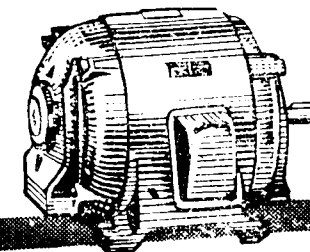


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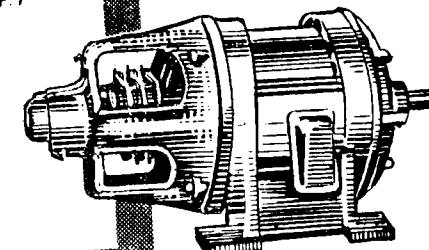
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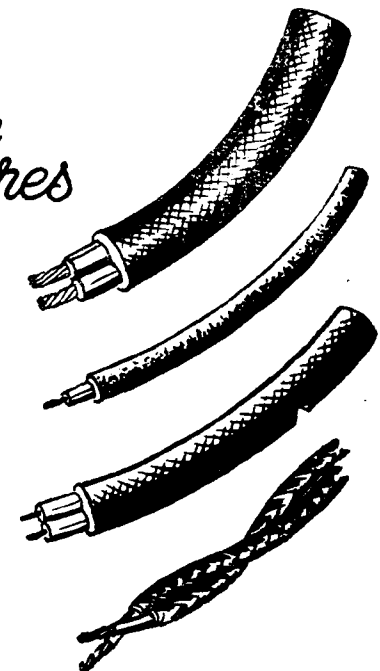
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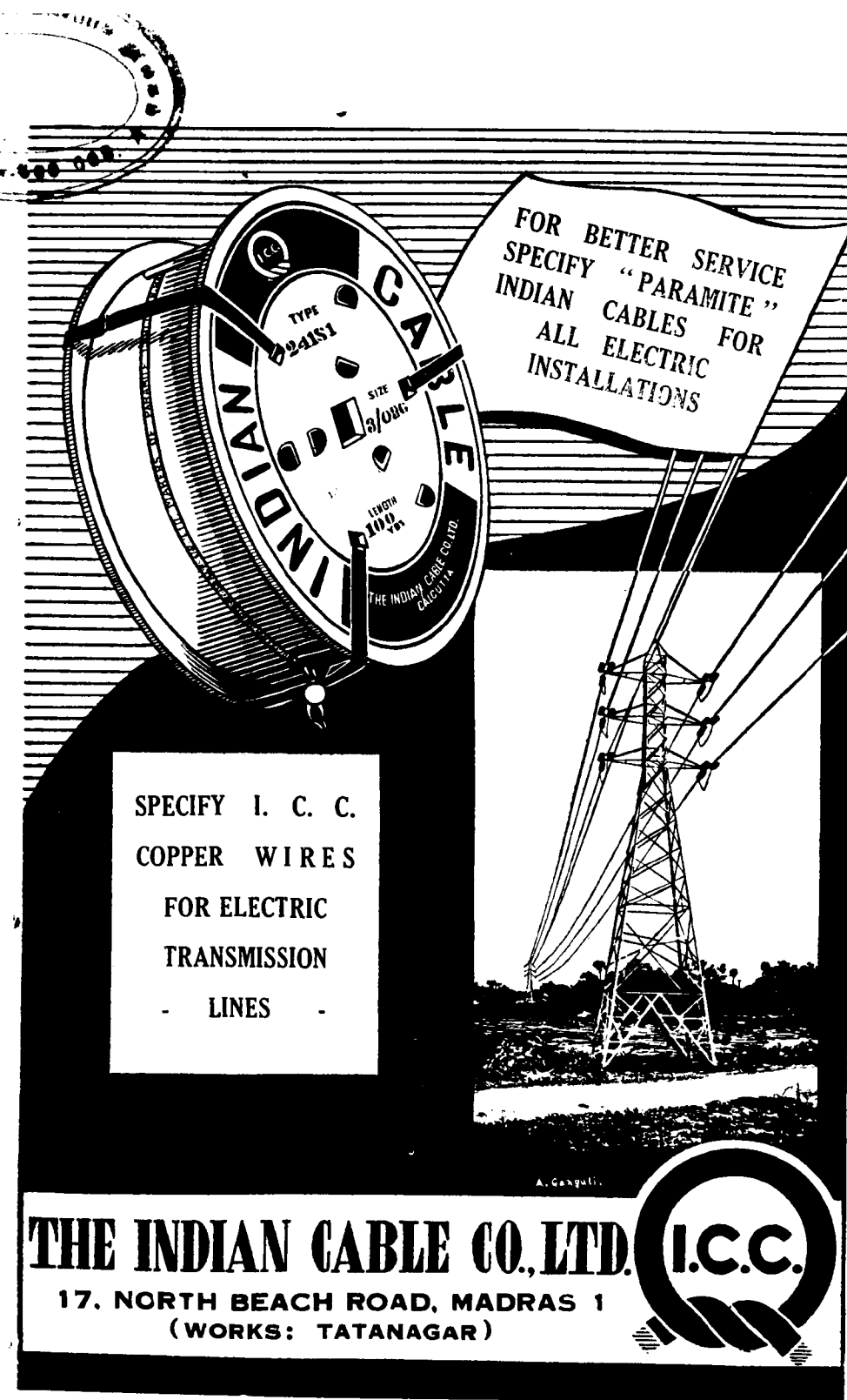
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Electolite

A Journal of Electricity Supply and Utilization

EDITOR: R. PARTHASARATHY

VOL. II

JULY — SEPT. 1950

NO. 3

TECHNICAL EDUCATION

A spate of reports has, of late, been issued on the subject of technical education and the authors of the various reports are all agreed on the need for more Institutes of Higher Technology as well as Polytechnics.

Both the Union and the State Governments have ambitious programmes of economic development, and normally all the boys who come out of all the institutes should be able to find employment. Actually, however, there is already a steady decline in the figures of employment of artisans and skilled workers, the reason being the shelving of blue-prints, for financial reasons.

This does not, however, mean that the case for more institutes, stands self-condemned; rather a re-orientation of educational policies is suggested.

In broad terms, the curriculum of studies at our polytechnics must be so framed that a boy should be able to set up on his own — with a little financial assistance from a local co-operative or Government—if necessary, in case, he does not succeed in finding other suitable employment.

Along with instruction in basic engineering, provision should be made for courses of study, say, like weaving and spinning on hand

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The views expressed in ELECTOLITE are not necessarily those of the Editorial Board

promotional programmes are, therefore, designed to benefit the whole electricity industry”.

Use of market research

“In the American conception of planning a sales promotional programme, for any commodity—soap or cars, cigarettes or electricity—some basic research into the market for that commodity is the first vital task. Accurate answers must be obtained to such questions as:—

Who are present consumers and who are potential consumers?

Where is the biggest opportunity for developing increased use?

Which aspect of our product offers the greatest attraction to the consumer?

What is the exact strength of the competitive effort?

In the case of the electricity industry, which appliances are likely to produce the biggest contribution to load building?

The Americans believe that only through skilful research can these and similar questions be answered accurately, and that advertising and promotional programmes can be built on a platform of factual information. To dispense with research is, in their opinion, like building an expensive house on straw foundations—a crazily false economy.

The first step in the research programme of an American power company is careful analysis of the area it covers, breaking down the market into urban and rural populations, economic levels, types of industries and businesses, numbers and sizes of farms and all other

factors which give the area its particular character. Surveys are also carried out to determine the extent to which electricity is already used by farms, by each type of industry and by domestic consumers, by types of appliances and equipment already installed.

The Americans also assess accurately by research the potential for lighting load. They quickly learned that an enormous undeveloped potential exists in this field. Their surveys revealed that—compared with standards recommended by lighting authorities and generally approved by vision specialists—30 million out of the total 42 million American homes needed on average four times as much light.

If there is any place where good lighting is important, it is in schools. They offer the opportunity to establish an appreciation of better standards of lighting with the householders and business men of to-morrow. Nevertheless, research proved that—2,58,000 American schools needed on an average seven times more light.

1,00,000 office buildings with more than one million individual offices needed on average five times as much light.

They found a similar state of affairs in industry.

2,00,000 American industrial plants needed on average four times as much light.

These statistics remind me that when the President of a big American electric lamp corporation was in London recently, he asked me—“How many more years

will the British lighting industry ignore the glaring sales opportunity represented by the fact that 99 out of every 100 British tailors and dress shops still let customers say ‘let me take it up to the light’?” What he meant, obviously, was that most of our shops are very badly illuminated.”

Execution of Advertising and Sales Promotional Programmes

“I have mentioned that in America there is a remarkably high degree of co-operation between the various sections of the electricity industry, which comes from the realisation that the aims of each branch are closely bound together. The efforts of the power companies to sell electric cookers obviously benefit not only the manufacturers of the cookers, but also the appliance manufacturers, distributors and dealers. Every electric cooker sold opens the door to the conversion of another household to the sole use of electricity, and makes the sale of additional appliances more easy. On the other hand, the advertising and merchandising activities of appliance manufacturers and dealers, benefit the power companies in helping them to build additional load.

Planned Lighting

This co-operation has resulted in many successful campaigns in which the American power companies, manufacturers of appliances, distributors and dealers have joined together in a nation-wide co-ordinated effort towards one specific target. These campaigns are normally sponsored by organisations such as the National

Electrical Manufacturers Association, or the Edison Electric Institute. One such programme sponsored by the “Better-light—Better Sight Bureau” of the Edison Electric Institute was the “Planned Lighting Programme”. This was designed to exploit the obvious opportunity for increasing load through lighting. The Americans use the slogan “Planned Lighting means Profit Load” to emphasise this point.

To make certain of obtaining the maximum support for this programme the E. E. I. consulted the other important organisations in the industry such as the N. E. M. A. and some of the big lighting appliance manufacturers, to obtain their ideas in advance. All branches of the industry collaborated so that the E. E. I. was able to produce an industry-wide programme with one theme—Planned Lighting. Consumers were to be told to have their lighting planned for them before buying and that this service would be given free. In this way, the risk of consumer dissatisfaction was minimised, the industry was protected against irresponsible selling of inadequate lighting, and the opportunity was created to boost lighting loads to record heights.

Sales Aids

Working in close co-operation with lighting manufacturers, separate plans were made for each of the five major lighting markets—home, offices, shops, factories and schools—so that each received specialized treatment. Each plan outlined the market, its size and potential development, and suggested advertising sales and

166961

and power machines, milling of cereals and oil-seeds, etc.

Again the Rehabilitation and Resettlement Ministry have, we learn with interest, imported various kinds of cottage industries' equipment from Japan and that technical experts have also come over here for training displaced persons from Pakistan.

Tremendous possibilities, therefore, open up for the establishment of a number of rural industries all over the country. As a consequence, there may be such resurgence in the seven million and odd villages of India that indeed Gandhiji's dream of (G) Ramrajya need not remain an impossible ideal.

Agriculture is already paying handsome dividends, and at the present pace of rural electrification, it must become even more of a paying proposition in the days to come. If in addition to agriculture, profitable "side-lines" using cheap electric power could be developed, incentive would have been provided for more people remaining in their own villages.

The Seshasayee Shashtiabdhapurthi Technological Committee have plans for the establishment of an institute of the kind envisaged here. Tiruchirapalli will be the proper location for such an institute on account of its contiguity to the rich district of Tanjore on the one hand and the not-so-rich district of Ramnad on the other.

From all these districts young men have constantly been migrating, as the villages were unable to support them, agriculture not enjoying, all these years, its present war boom.

The sponsors of the Seshasayee Shashtiabdhapurthi Institute have, we are happy to learn, plans for offering courses of study carrying a *particular-cottage industry* bias. Their experiment must certainly be worthwhile watching, as the country needs any number of such institutes.

Meanwhile, we would strongly endorse the appeals issued by the Committee for funds for the Institute.

PUBLICITY FOR LOAD BUILDING

by Guy R. Mountfort

Summary of paper presented at thirteenth Sales Management Conference

REVIEWING the question of publicity first, Mr. Mountfort pointed out that manufacturing companies in other spheres had used the lull during the change-over from a sellers' to a buyers' market in overhauling their publicity programmes. He stated: "In the electricity industry we have already seen the beginnings of the return to competitive market conditions in the field of electric appliances. Indeed, for some of the industry, such as radios, the honeymoon of a sellers' market ended long ago".

Continuing the speaker said that the British power industry was in a particularly embarrassing position; the gas industry, for example, which had got away to a good start was outselling them in the cooker field by three to one.

Nevertheless, he suggested that they should consider the planning of an all-out campaign for load building now.

Policy of U. S. Power Companies towards load building

Power companies in the States, Mr. Mountfort stated, "sold" not only the companies themselves, but the entire industry. "Until a customer has bought more lighting, more appliances or more industrial equipment power company sales cannot increase. Their advertising and

At the British Electrical Development Association XIII Sales Management Conference held in London, during early May, several interesting papers were presented. The first was, "Publicity for Load Building" by Guy R. Mountfort, Deputy Chairman, Advertising Advisory Council, Dollar Exports Board, and a Director of Mather & Crowther Ltd., Advertising Consultants, London. Although permission to reproduce the paper in full has kindly been given by E. D. A. pressure on space precluded such publication.

We give here a brief summary together with a few excerpts from Mr. Mountfort's instructive paper.

In doing so, we would like to recall here what Mr. N. V. Gadgil, Minister for Works, Mines and Power said when he inaugurated the All-India Power Engineer's Conference, in Delhi, during February last. Mr. Gadgil warned Engineers to guard against any possible maladjustment between the production of power and its utilization. He stated that India's total annual consumption of electricity in about 10 years would probably be 10,000 million kWh. Whilst what they required to meet this increase in power was roughly an additional generating capacity of 1.9 million kW., they would have according to present plans, an additional capacity of 3 million kW - an excess of one million kW.

There were only two ways according to the Minister, in which this maladjustment could be corrected. Either they could develop their load faster than they did even during wartime or they must eliminate from their development schemes all uneconomic plans.

Tremendous, indeed, is the scope for power utilisation in a country of the geographical size of India, and of such backward economy as hers.

Not only have we to increase production in all our present industries, but we have to set up several more new industries. Apart from industrial loads, we have to develop domestic loads, too. Electric cooking, electric washing, electric laundering have all yet to catch the fancy of the Indian housewife.

The summary given in these pages will, we hope, give broadly the lines on which load building might be planned.

promotional methods best suited to exploit that market. For instance, the plan for the home market included a prospectus for speculative builders, a booklet of information on lighting for people building new homes, and direct mail pieces for householders, containing ideas for modernising existing lighting. Similar specialized material was designed for each of the other lighting markets and a full range of point-of-sale material was produced. As this was prepared centrally by the E. E. I., individual power companies were able to buy the material far more cheaply than if they had produced it themselves.

The complete advertising campaign for planned lighting included films, slides, newspaper and radio advertising ideas, magazine and newspaper editorial publicity, and outlines for lectures and demonstrations. Suggestions were also made for co-ordinating the advertising of each power company into the national campaign. The cumulative effect of the combined national and local advertising, the standardised point-of-sale material in dealers' shops throughout the country, and the consolidated sales effort of the entire industry, made an impression that no un-coordinated effort by individual power and appliance companies could have achieved.

Power Company advertising expenditure

All other things being equal, sheer advertising weight counts heavily in a country where every medium is crowded with competitive claims and counter-claims.

After all the research and planning have been completed, the effectiveness of a sales campaign is usually in direct relationship to the amount of advertising money invested in its support. The more you put in, the more you usually get out.

Some of the more progressive American power companies spend considerably in excess of the national average. The Philadelphia Electric Company is an outstanding example. This company's yearly advertising appropriation increased from around \$ 75,000 in 1930 to about \$ 5,00,000 just before the war, and this year I understand that they plan to spend at least \$ 600,000. This is equivalent to 20 cents—or 1s. 5d.—per head of the three million population in their area and compares with something under 6d. per head which the Combined British Electricity Industry will probably spend. If we in this country were to spend at the same rate for electric power advertising as Philadelphia Electric, we would be spending more than £ 3,500,000 per year. It would be stupid to consider doing so in to-day's conditions, of course, but the comparison is stimulating."

Concluding Mr. Mountfort said: "Winston Churchill has told us how the success of 'D' day was assured by meticulous planning and training which started back in 1942. Our great post-war economic victories have yet to come, and they will be speeded, as were our war-time victories, by far-sightedness in planning, courage in adopting new measures, and boldness in executing them."

ULTRASONICS IN INDUSTRY

New Applications in Prospect

COMMERCIAL applications of ultrasonics to industrial processes, the possibilities of which in chemical and metallurgical operations are important are brought nearer by the development of the new low frequency magnetostriction generator, which according to *The Chemical Age*, is the subject of a technical note by the electronic equipment division of Mullard Electronic Products, Ltd.

The first of its kind, the generator considerably widens the scope which was offered by the first commercial high frequency quartz crystal generator which the company introduced earlier in the year for laboratory use.

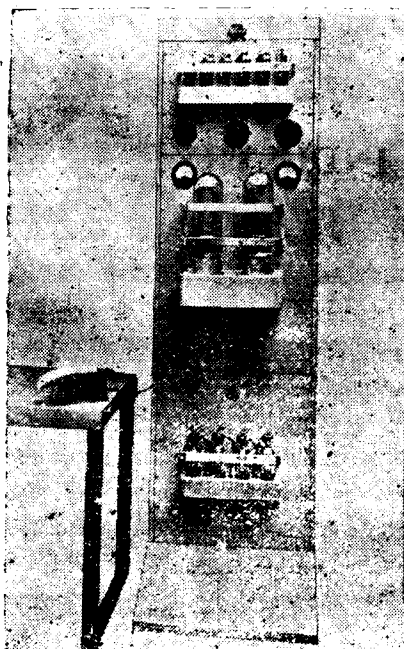
That generator is proving its value in ultrasonics research, especially in the treatment of extremely fine particles and bacteria, but the limitation of its power to 500 W. precludes its successful use in production processes. The new magnetostriction generator overcomes this difficulty.

Standard generators so far have powers of 1 kW or less, and are intended primarily for experimental use, but there appears to be no limitation to the ultrasonic power that may be produced by generators of this class.

The Mullard low frequency ultrasonic generator consists of a main unit (a driving oscillator, power amplifier and low voltage d.c. power supply, with monitoring and check meters) and the transducer unit (a stack of nickel laminations wound with a common coil for excitation and polarisation). The amplifier, which provides the source of power for the transducer, is basically similar to that used effectively in public address equipment, and delivers a maximum output of 1 kW over a frequency range of 10 kc. to 25 kc.

The Magnetostriction Transducer

The industrial suitability of the equipment is associated almost entirely with the design of the magnetostriction transducer. The insulation of this is such that the whole unit may be immersed in conductive liquids without fear of damage or electrical shock. In practice, the transducer can quite easily be clamped against the side of the treatment bath. Alternatively, it can be fitted in a pipe junction, enabling the liquid to be treated as it flows over the actuating face. More compact and giving higher power outputs than previous transducers of the rod type, it can readily be produced to serve individual requirements. With simple cooling arrangements,



(Courtesy : Mullard Electronic Products, Ltd.)

The tray mounted on the transducer (left) contains two normally immiscible liquids of which an emulsion can be made by the ultrasonic effect.

a loading of about 5 W per sq. cm. can normally be used.

The three equipments available now are: 1 kW, weight 448 lb.; 500 W, weight 452 lb.; and 250 W, weight 364 lb. All are 60 in. high by 20½ in. wide by 23 in. deep.

Reviewing some of the likely uses of the new equipment, the Mullard Company notes that it offers scope for work in the metallurgical field in the mixing of powdered and molten metals in alloy production. It is possible that the equipment could also be used for speeding up the process of solidification in molten tin and aluminium, and for the tinning of aluminium and similar metals.

Emulsification of a number of liquids, and the precipitation or dispersion of particles in suspension are further possibilities of ultrasonics. A certain amount of success has already been achieved in cleaning and washing applications, by which can be produced a much higher degree of cleansing.

Automatic Power Factor and Load Control for Industrial Plant

Synchronous Condenser

THE reduction of the maximum kVA demand of Industrial Electrical Supply systems by power-factor improvement and, in some cases, load control, was practised as an economic measure long before load shedding became a matter of national importance. It was proved then that the capital cost of the equipment for maximum demand control was recovered in two or three years and subsequently there was a considerable annual saving in power costs. To-day the economic advantage of kVA demand control is still paramount but in addition such control demands special consideration as a means of avoiding power cuts and thereby assisting industry to maintain full production with benefits to all concerned.

An interesting example of the application of combined power-factor improvement and load control equipment in a large works is the installation at Messrs. Lake & Elliot Ltd., Braintree, Essex, England, iron and steel founders, and manufacturers of the well-known automobile jacks.

Until a few years ago Messrs. Lake & Elliot operated a works' generating station which had a capacity large enough to supply their own load and a surplus for other industrial and domestic consumers in the district. As their works' load increased it became necessary to supplement the generating station output with an intake from the supply company.

To reduce the kVA loading on the works' low-voltage system, power-factor improvement was effected by the installation of a 300-kVA synchronous condenser, with automatic power factor control, in one of the L. V. substations supplied from the private generating plant. Improvement was carried up to 0.95 lagging, which was considered to be the economical limit.

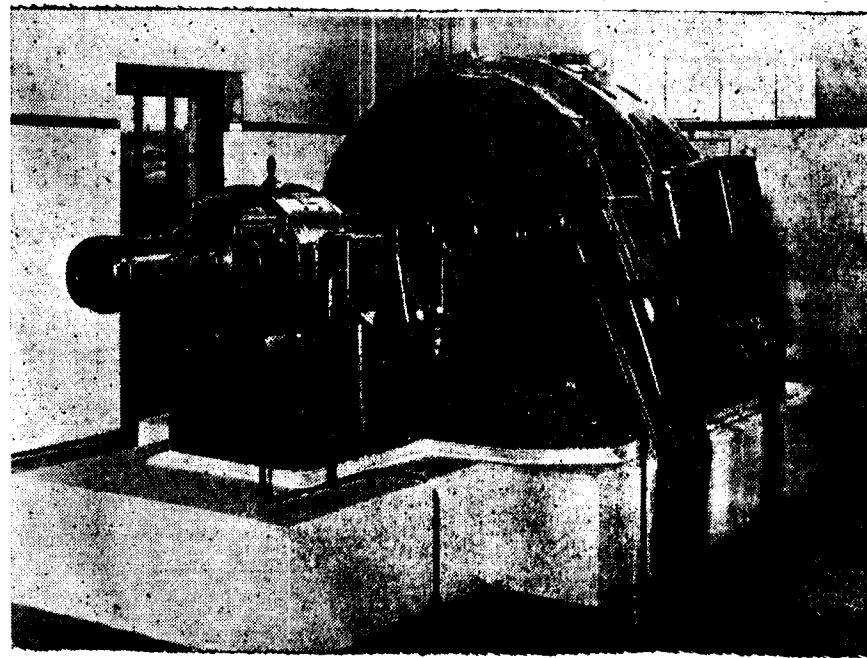
With a further increase in the load demand, additional main substation equipment was installed to provide for all power requirements from a high-voltage bulk supply, and the generating plant was dismantled. As the advantages of power-factor improvement had by this time been fully proved it was decided to extend the scheme and also install equipment for a complementary method of reducing the kVA maximum demand by load shedding. This programme required the installation of: (1) another synchronous condenser with automatic control for improving the power factor of the entire load intake and (2) equipment for the controlled load shedding of the arc furnace load to reduce the maximum demand on the system without making any appreciable effect on production.

Each of these schemes can be operated independently to reduce the maximum demand kVA., but in practice they are operated together to obtain accumulative reduction to prevent the maximum

demand exceeding a pre-determined value. This value was first of all calculated and subsequently adjusted to the optimum value that would allow for the maximum reduction without any loss in works' production.

Substation Layout

To improve the power factor of the total load the synchronous condenser is



750 kVA, 6.6 kV Synchronous Condenser

connected to the 6.6 kV busbars in the main high-voltage substation. The substation layout consists of 11 kV switchgear controlling three incoming bulk supply feeders, and three 11/6.6 kV outdoor transformers; with 6.6 kV switchgear controlling feeders to works' substations and furnaces. Transformers were installed when bulk supply was first taken so that the existing 6.6 kV system could be

retained, and also serve to limit the short circuit kVA.

The synchronous condenser, manufactured by Crompton Parkinson Ltd., is a 6.6 kV, 750 r.p.m. machine with a continuous rating of 750 kVA reactive loading, and an overload capacity of 25 per cent. for two hours. In effect, the machine generates reactive kVA for inductive apparatus and thus reduces the

amount drawn from the supply. The amount of reactive kVA generated is varied by regulation of the excitation, and can therefore be adjusted as the system load changes so as to keep the overall power factor at a high value.

The machine is easy to start and is fully self-synchronising, the only controls being a stator switch and a contactor-type rotor starter with fully automatic

push-button starting and stopping. One of the solenoid-operated oil circuit breakers of the 6.6 kV switchboard is used as the stator switch.

Special Feature

A special feature of the machine is that in addition to the standard D. C. exciter associated with synchronous machines, it has a pilot exciter for separate excitation of the exciter shunt field for the purpose of maintaining inherent stability over the full range of load.

For power-factor control an exciter shunt field regulator is automatically adjusted by a servo motor; but can be operated by hand when required. Master control is by an induction pattern power-factor relay which can be pre-set to remain stable at a pre-determined value. Any variation from the setting causes the relay to become unbalanced and to rotate in the appropriate direction to close contacts which initiate the operation of relays to adjust the shunt regulator. The power-factor relay had to be designed for satisfactory operation with wide variations of load, often in the form of surges, accompanied by corresponding variations, particularly with the erratic conditions inherent in arc furnace loads, because some form of "hunting" would result. To avoid this, but at the same time obtain an adequate sensitivity, the relay was designed to give proportional control—that is, its speed of response is proportional to the deviation from a pre-set power factor and embodies a measure of integration over short periods.

In practice, the overall automatic power-factor control is quite satisfactory under the most severe conditions. Apart from momentary deviations due to load surges, which the relay is not intended to follow, the power factor is automatically maintained at a constant value.

Close and smooth adjustment of the reactive kVA, and therefore the overall power factor, is obtained by an exciter shunt field regulator with sixty contacts giving small uniform steps of variation.

This installation improved the power factor to 0.95 lagging, which is considered the most economical maximum. The actual overall power factor at times of maximum demand on the system, calculated from the supply company's trivector, is 0.955 lagging.

The loading conditions are such that the machine runs within its nominal rated capacity for most of the day in order to maintain a 0.95 lagging p. f., but during peak periods when a higher output of reactive kVA is required to maintain this value the overload rating of 25 per cent, for two hours is utilised. The installation effects a reduction of 350 kVA in the maximum demand.

Apart from being a means of maintaining overall electrical power costs, power factor improvement, by reducing the current for a given kW loading, ensures that switchgear, transformers and cables can be loaded more efficiently, since their current carrying capacities are not partially utilised by the circulation of reactive kVA; and also voltage regulation is improved and the copper losses reduced.

Sir Oliver Heaviside

(Centenary celebrations of a mathematical genius)

At a meeting held in London, in the month of May by the Institution of Electrical Engineers to mark the centenary of Sir Oliver Heaviside Sir George Lee gave a lecture entitled "Heaviside the Man," which was followed by tributes to Heaviside from Sir Edward Appleton, Sir Archibald J. Gill, Prof. Harold Jeffreys, Dr. G. F. C. Searle, Sir Edmund Whittaker and others.

Mathematical Genius

Like many great men Heaviside received nothing beyond an elementary school education, but through his own efforts he became one of the pioneers of electrical communication, a mathematical genius who laid the foundations of electrical wave propagation truly on the experimental work of Faraday and the scientific theories enunciated by Maxwell.

In his personality he was not a normal individual and the saying that "genius is akin to madness" represents a fair description of him. Dr. Silberstein, who assisted him in preparing the final volume of "Electromagnetic Theory," said he liked to work in a room that was "hotter than hell," a peculiarity which was also shared by the great French mathematician Fourier.

Although he started work in 1868 as an ordinary-telegraph operator he soon absorbed all the mathematical methods current at that time and before long he was filling the pages of the *Electrician* with papers which were far too difficult for most readers of that journal. They

were not alone, for the referees of the Royal Society had the same trouble.

Rise to Fame

In 1874 he was elected an associate member of the Society of Telegraph Engineers, later the I. E. E., and in the same year he returned to live with his parents in London, where he did most of his original work. In 1876 he was elected to the Council of the Society of Telegraph Engineers, but did not attend a single meeting and in 1881, because he was unable to pay his subscription, his name was struck off the register.

Early in his studies he discovered that a.c. circuits could be treated by the rules for d.c. if the inductances were considered as resistances of the form $j\omega L$ and capacitances as $\frac{1}{j\omega C}$, the algebraic operations being performed according to the rules of complex numbers. Later, he established the present-day method of analysing alternating currents, about 15 years before a.c. came into commercial use.

In dealing with transients he used the Fourier theorem, which expresses a transient as the sum of an infinite number of steady state solutions. The difficulty of dealing with infinity is overcome by assuming that there are upper and lower frequency limits, this method now being normally used in telephone mathematics.

After the death of his parents, Heaviside went in 1909 to live with his sister-in-law at Homefield, Torquay, where he remained until his death in 1925.

Meanwhile, the telephone had been invented and it captured the mathematical interest of Heaviside, his great achievement being the formulation of laws governing the propagation of telephone and telegraph signals on wires and cables. In particular, he pointed out the importance of inductance for counteracting the electrostatic capacitance of the circuits.

Further interesting examples of his work involved the setting out of the conditions for the distortionless transmission of speech, which is unfortunately not a practical proposition for economic reasons, and the problem of reflections in telephone circuits, this being dealt with either by 4-wire circuits, in which the go and return paths are kept separate or by vacuum-tube devices designed to block the return path. In his work on electric wave propagation Heaviside also showed how the waves are reflected from conduction obstacles, a condition subsequently used in radar.

'Dear Old Man'

In the main, Heaviside's work was not appreciated during his lifetime because of its great difficulty, but it is some consolation to know that he was the first recipient of the Faraday Medal and that the President of the I. E. E. went specially to his home at Torquay to present it.

Towards the end Heaviside lived a very lonely and poverty-stricken existence, cooking his own food and suffering from indifferent health. On February 3, 1925, he died at Mount Stuart Nursing Home and was buried at Paignton. Although he was such a quarrelsome individual the

people at the nursing home where he spent his last few days said he was "such a dear old man." This perhaps removes the impression of irascibility given by many of his later letters.

Technical Work

Prof. Willis Jackson presented a paper giving "An Appreciation Of Heaviside's Contribution To Electromagnetic Theory." The author reviews the various aspects of Heaviside's study, representation and simplification, and utilization of Maxwell's theory of electromagnetic wave propagation in his successful endeavour to develop a comprehensive theory of telegraph and telephone line transmission. This paper is unusually interesting as it deals in comparative detail with the staggering amount of work which Heaviside did in the field of electromagnetism and illustrates the spontaneity of his style and his powers of deductive reasoning. A selection of extracts from his published works is also included.

Heaviside's operational calculus was then treated in a paper by Prof. Balth. Van Der Pol and was shown to be a very effective simplification of the ordinary calculus. Essentially, this comprises the use of the symbol p to indicate the operation of differentiation instead of $\frac{d}{dx}$ and $\frac{1}{p}$ to indicate integration, with the condition that p^2 signifies differentiating twice and p^3 differentiating three times. This symbol is then manipulated algebraically and it should be noted that in a.c. work p is equivalent to the symbol used in vector analysis.

The strong and at the same time unfair criticism which this method evoked can be traced to the unsystematic way in which Heaviside treated his problems and to his lack of mathematical rigour. His solutions to problems on the propagation of disturbances over long lines are often astounding and he derived new relations between mathematical functions which even to-day cannot be approached by classical methods. His calculus is invaluable in the study of transient phenomena as long as these obey linear equations.

Comparison with Ramanujam

Prof. Van Dear Pol stresses the nature of Heaviside's achievements and draws a parallel between his life and that of the Indian mathematician Ramanujam. The second part of the paper deals with modern developments of the operational calculus, both fundamental and applied. Carson's work in justifying Heaviside's methods by the Laplace transform is emphasized and it is shown that Heaviside himself was aware of this basis to his calculus.

Many recent extensions of the operational calculus have been founded on the Laplace transform and a generalized calculus allows more mathematical functions to be covered than by Heaviside's original methods. This calculus is found to be of great use in some branches of pure mathematics including the theory of numbers.

Special Contribution

The greatest contribution which Heaviside's work has made to electrical

engineering has been in the field of long-distance telecommunication and in relation to this work Dr. W. G. Radley presented a paper reviewing fifty years' development in telephone and telegraph transmission. The paper describes the technique of loading land and sea cables with inductance and it is explained that Heaviside was the first to investigate mathematically the problem of the coaxial cable. The use of this and other types of modern transmission is referred to briefly.

Heaviside investigated the reflection of magnetic waves in heterogeneous space and suggested the possibility of a reflecting layer in the upper atmosphere. Some account is therefore given of the physics of the ionosphere together with a description of various systems which have been developed to overcome the effects of ionospheric irregularities on long-distance radio-communication. The paper concludes with a brief reference to possible future methods of transmitting information which may emerge as a result of contemporary study of the problem of long distance communication.

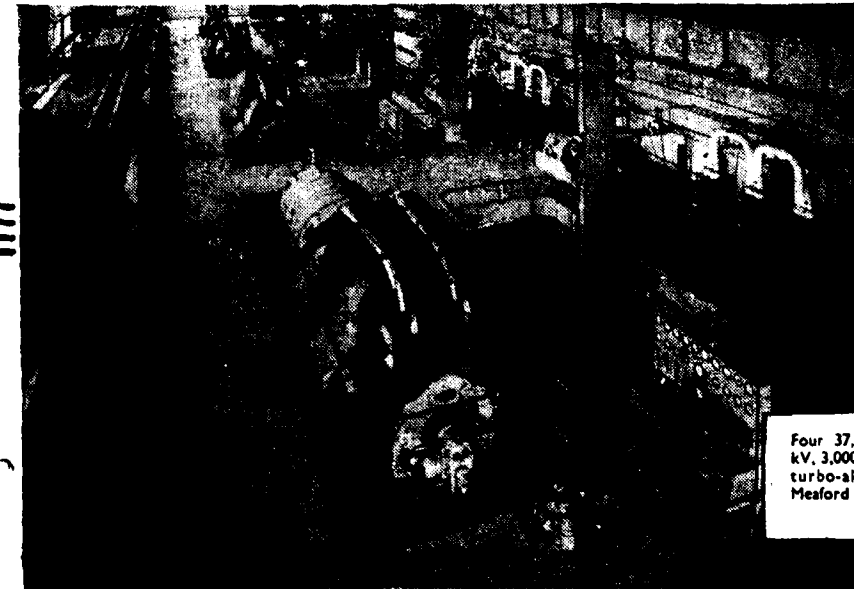
In conclusion, Mr. H. J. Josephs gave a *resume* of a paper on "Some Unpublished Notes of Oliver Heaviside" which he had prepared from the Heaviside papers and documents in the possession of the Institution.

Further interest was added to the occasion by the arrangement in the entrance hall of the Institution building of an exhibition of Heaviside's manuscripts, notebooks and letters. —*Electrical Review*.



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A LOOK IN A PLAY ON GOOD AND

Secretary: Good morning, Mr. Fairplay.

Mr. Fairplay: Good morning, Miss Johnstone. That is certainly a smart new dress you are wearing.

Secretary: Thank you, Mr. Fairplay.

(Mr. Fairplay seats himself at his desk and starts reading his morning mail)

(Secretary buzzes Mr. Fairplay on the intercom.)

Secretary: Mr. Arndt to see you sir, on a matter of personal importance.

Fairplay: Send him right in.

Janitor *(enters office, hat in hand)*: Good moorning, Mr. Fairplay.

Fairplay: Good morning, Mr. Arndt. *(Motions to chair)* By the way, I noticed you've fixed the supply room door — nice job. Miss Johnstone tells me you have something on your mind.

Janitor: It's about my wife, sir — another operation. I need \$ 150 and the people upstairs won't pay me their rent, and I just gotta raise that money.

Fairplay: Yes, I know about your wife. Our company doctor says this last operation will do the trick. Well, we will be glad to help you on this from our special fund. *(Buzzes secretary)* Miss Johnstone, please make the arrangements with the cashier for an emergency loan for Mr. Arndt.

Arndt *(gets up to go)*: Thank you. Thank you, Mr. Fairplay.

Fairplay: Just one more minute. I think we can help you on those deadbeat tenants of yours. *(He calls the company attorney on the phone, and makes an appointment for Mr. Arndt.)* Our attorney will see you in fifteen minutes. Goodbye Mr. Arndt. Let me know how your wife gets along.

THE MIRROR! OFFICE MANNERS* BAD

(The Secretary enters and seats herself at her desk and starts sorting the morning mail).

(Mr. Pompous enters).

Secretary: *(cheerfully)*: Good morning, Mr. Pompous.

Mr. Pompous *(grumpy)*: G'morning. *(He seats himself at his desk and starts to read his mail).*

(Janitor comes in dressed in overalls and asks to see the boss).

(Secretary buzzes Mr. Pompous on the intercom.)

Secretary: Mr. Arndt to see you sir, on a matter of personal importance.

Pompous: Who's Arndt?

Secretary: He's our night janitor, sir.

Pompous: Tell him to come back this afternoon.

Secretary *(tactfully)*: He's our night janitor, sir, and it would be very difficult for him to return this afternoon. I don't think he will take more than a minute.

Pompous: Oh, well—I'm awfully busy but—send him in.

(Janitor enters, hat in hand).

Pompous: Well, Arndt?

Janitor: I'm real sorry to bother you this way, Mr. Pompous but—

Pompous: I understand this is a personal matter and you know we don't interfere in the private lives of our employees.

Janitor: Yes sir, but I don't know who else to see about—

Pompous *(interrupts again)*: Well, I advise you to borrow from a bank or loan company. That's their business, not ours. If you would save a certain amount out of each pay you wouldn't get yourself into such a situation. Is there anything else I can do help you on?

Janitor *(backing out slowly)*: No sir, Mr. Pompous. Thank you, Mr. Pompous.

(Mr. Batcheller enters and sits by secretary's desk).

(Secretary buzzes Mr. Pompous on intercom.)

* This play comes to us through the kind courtesy of NOMA FORUM - organ of the National Office Management Association, Philadelphia, Pa. Thanks are due to our Mr. R. Varadarajan (who is a member of this Body) for arranging for its reproduction, in ELECTOLITE.

GOOD (Contd.)

(Secretary buzzes Mr. Fairplay).

Secretary: Can you see Mr. Bowen for a few minutes around ten? He only has a few moments between trains.

Fairplay: Yes, I would like to see him. By the way, will you change my appointment with my barber to tomorrow?

* * *

(Secretary buzzes Mr. Fairplay)

Secretary: Mr. Batcheller to see you, sir. It's about a new idea he has.

Mr. Fairplay (stands up): Come in, Batcheller — let's see what you have. (Batcheller shows the form and explains what it will accomplish).

(Enter Logan and Sweet — sit by secretary's desk).

Fairplay: Looks like a sound idea to me. (Picks up phone and dials). Hello, Joe? This is Fairplay. Ben Batcheller just dropped in with a new idea in billing which seems to have merit. Can you stop by this afternoon to talk about it? Thanks Joe. (Turns to Batcheller). I'll call you this afternoon Batch and keep that observant eye of yours open for more good ideas.

* * *

(Secretary buzzes Mr. Fairplay)

Secretary: Mr. Logan and Mr. Sweet are here. You sent for them.

Fairplay: Send Mr. Logan in. (Logan enters). Good morning, Fred. Won't you sit down? (Logan seats himself and is obviously nervous) Fred, I have been reviewing your production record and I notice you haven't been up to your usual good standard for the past three or four weeks. I thought it might be a good thing if you would tell me first hand what you think the reason for this is.

BAD (Contd.)

Secretary: Mr. Bowen of our New York office would like to see you, if possible, at ten this morning. He has an hour between trains.

Pompous: I'm sorry, I have an appointment with my barber at that time. Too bad—I'd like to see old Bowen. Tell him to be sure to drop in the next time he's in town.

* * *

(Secretary buzzes Mr. Pompous).

Secretary: Mr. Batcheller to see you, sir—it's about a new idea he has for the Billing Department. (To Batcheller): Go right in.

Pompous: Hello, Batcheller. Sit down. (Slightly sarcastic) Understand you've dreamed up an idea to revolutionize the Billing Department?

Batcheller: Not exactly sir—it's rather a small thing. See here (shows a form) a spot carbon here and a foldover and we could use the copy for our ledger entry.

Pompous: The form would cost more than we would save.

Batcheller: I've checked on that, sir, and I am sure we would save a net of \$30 a month at least. Of course that is n't much but—

Pompous (vaguely): Well, I want to give this a little more thought—\$30 a month, eh? Well—(Puts form in unfinished business drawer which is crammed full)—(Very patronizingly) Batcheller, I consider \$30 per month saving very important to this company. The man on my job has to think of the pennies. A dollar saved is a dollar earned, I often say.

(The interview is obviously over as Mr. Pompous resumes his reading. Mr. Batcheller, a little abashed, leaves).

* * *

(Secretary buzzes Mr. Pompous).

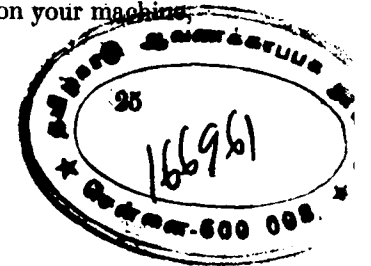
Secretary: Mr. Logan and Mr. Sweet are here sir. You sent for them.

Pompous: Send them both in.

(Logan and Sweet enter office)

Pompous (motions of the men to sit down—glances at them for a second or two): I understand you two men are a couple of trouble makers. (No answer). Logan, they tell me your production is off 25% and that you blame it all on your machine and that—

26
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GOOD (Contd.)

Logan : I know my production is down Mr. Fairplay, and it's because I am having trouble with my machine. I have reported it several times but the repair man says it is worn out. I admit I get pretty disgusted at times and probably don't do as well as I could.

Fairplay : We have been contemplating a different type of machine for your work Fred, but we need some on the job tests. I think you are the most logical one to make these tests. Would you like to help us ?

Logan : I sure would Mr. Fairplay. You can count on me.

Fairplay : Good, We'll have the Save Time people in here next week.

(Logan leaves)

(Mr. Sweet comes in at once)

Sweet : You wish to see me Mr. Fairplay ?

Fairplay : Yes, Harold, (*Motions to chair*) I have had it in mind to talk to you for some time about yourself. You have been here now for about 18 years.

Sweet : (*proudly*) : Yes sir. Started right at the bottom of the depression.

Fairplay : By and large you do a pretty fair job, but I believe you can make yourself even more valuable to us if you want to try.

Sweet ; I certainly do. I'll do whatever you say.

Fairplay : Well, Harold, perhaps it isn't that easy. You know you are a senior man in the office now and the younger employees are apt to be influenced to a considerable degree by your attitude to your job and our company.

Sweet. I don't see what that has got to do with my getting ahead.

Fairplay : I'm coming to that, Harold. You are inclined to be very outspoken, particularly about things that concern you personally. That in itself is not objectionable provided your remarks are addressed to management. You know our policy is to learn, understand and correct any condition which causes complaint among our people. You have, on many occasions made remarks within the hearing of our younger people which are detrimental to morale, even though you did not intend them to be so. The older people here know and understand you but the point I want to make is that the words of a man of your experience should carry weight with all our people and not be misconstrued by some and discounted by others.

Sweet : I have to admit it but I guess you're right.

BAD (Contd.)

Logan (*interrupts*) : It is the machine.

Pompous : Your machine was reported ok by your supervisor last week. He also reports that you are non-cooperative and a clock-watcher.

Logan : The machine is not working properly and I can't get my production on it. The supervisor is trying to make a showing by not spending anything on equipment. Sure, I watch the clock. I am so damn glad to get out of that department at night that I don't waste a minute doing it either.

Pompous : Your attitude bears out the report I have on you. (*Turns to Sweet*). I understand that you are a confirmed griper—always complaining about your salary, or vacation, or the wash room or the weather. If you don't like it here, why don't you get another job ?

Sweet : I have been here 18 years, Mr. Pompous and I like this company. I feel I should have the right to discuss things that concern me. I also feel that any suggestions I make should be considered as such and not as gripes.

Pompous (*icily*) : Don't you think that you are given fair consideration, Sweet ?

Sweet : I don't know what to think. Apparently I am being classed as a trouble-maker for bringing these matters to the attention of the management.

Pompous : Well, I think you men are both well treated and you know we expect your co-operation in return. I want you both to get back on the job and stop concerning yourself about things which are none of your business.

(Logan and Sweet exchange glances and get up and leave).

Logan (*to Sweet*) : That guy sure thinks he is a little tin god.

* * *

GOOD (Contd.)

Fairplay: Well Harold, it is something that can be corrected. You have a good background in this business and people look to you. As I said in the beginning, you can be more valuable to us if you want to.

Sweet; I certainly do want to, Mr. Fairplay, and I'll appreciate your checking me up if I slip a cog. I guess it is time I learned to keep my mouth shut. *(Gets to his feet)*,

Fairplay *(makes a note on calendar)*: Let's talk about this again in 60 days—shall we?

Sweet: Yes Sir. I am sure there will be a noticeable change by that time. Thanks.

(Sweet goes out).

*

*

*

Knapp: Is Mr. Fairplay free, Miss Johnstone?

Secretary: Yes, Mr. Knapp.

(Mr. Knapp goes into office)

Fairplay: Good morning, Mr. Knapp,

Knapp: Good morning, How are things around the office?

Fairplay: Going very well Sir. By the way, drop by the Shipping Department if you get a chance.

Knapp: I just came from there. It looks very orderly and efficient. Whose idea was that?

Fairplay: Charlie French's. He's a real comer. I want to show you an idea that another one of our young men in the Billing Department had. *(Shows the form)*. We are very proud of the men.

(Back in Mr. Fairplay's office)

Knapp: I should say so! It is always very gratifying to me to see new leaders raise their heads above the common level. *(Starts to leave)* Ken, I am very glad to see that you are taking the time to develop these young men.

(Knapp leaves office)

(Secretary buzzes Mr. Fairplay).

BAD (Contd.)

(Secretary buzzes Mr. Pompous).

Secretary: Mr. Knapp said he would be by on an inspection tour this morning.

Pompous: *(takes his feet off desk and frantically starts to straighten up his desk)* He is? What's he want to go poking his nose around here for? You'd think the president of the company would have enough to do without checking up on minor details. *(Picks up a paper and pretends to be studying it)*.

(Mr. Knapp approaches secretary).

Secretary: Yes, he's in Mr. Knapp.

Pompous *(a great big artificial smile on his face rushes around the desk to shake hands)*: Good morning, Mr. Knapp. It's nice to see you sir.

Knapp: Good morning, Tom—just doing a little visiting this morning. I don't have as much time as I'd like to meet and talk to our folks. By the way, I like the new arrangement of the Shipping Department.

Pompous: Oh yes—little idea of mine—quite efficient. By the way, I am working on an improvement in the billing forms. *(Picks up Batcheller's form)*. Which I think will be helpful—small thing though *(Modestly)*.

Knapp *(looking briefly at form)*: I see. By the way, Tom, we seem to be having considerable expense on Logan's machine lately.

GOOD (Contd.)

* * *

Secretary: Mr. Surbrook is here Sir.

Fairplay: Send him in.

(*Surbrook goes in*)

Fairplay: Good morning, Mr. Surbrook. You are the new representative for Save Time, aren't you?

Surbrook: Good morning, Mr. Fairplay. Yes I am. I have just moved my family here from Scranton. (*Starts to unfasten brief case.*)

Fairplay: That's fine. I know your family is going to like Detroit. We have a good school system and organized playground activities during summer vacations.

Surbrook: I know you're a busy man. Mr. Fairplay, and I will be as brief as possible (*Lays out literature on desk*).

Fairplay: I am very much interested in this new machine and I want to know all about it, but I think it will save you some time if I have our department head listen in now.

(*The department head comes in and sits down. The three of them talk together silently.*)

C U R T A I N

BAD (Contd.)

Pompous: I am making plans to replace that machine in the near future, Mr. Knapp.

Knapp: That's fine. A poor machine is expensive and hurts the employee's morale.

(*Mr. Knapp returns to secretary's desk*).

(*Salesman, H. Surbrook sits down*).

(*Secretary buzzes Mr. Pompous*).

* * *

Secretary: Mr. Surbrook of the Save-Time Machine Company is here for his appointment to see you.

Pompous (*eating an apple and reading a newspaper*): Tell him to wait.

(*Pompous' telephone rings*).

Pompous: Hello—Who? Oh yeah! How are you Striffler? That's great. Oh I haven't played since Sunday—shot a 94—never sank a putt all day. How did you shoot? etc. etc. (*Conversation fades away as Pompous turns his back to the audience and keeps on talking*).

(*As Knapp leaves Fairplay's office, Pompous again turns to the audience still talking on the phone*).

Pompous: Well that's a swell idea, Ken. Sure I can get away. I'll meet you at the club at noon—fine. Goodbye.

Pompous (*loudly*): Miss Johnstone, I'll see that peddler now.

(*Salesman goes in*).

Surbrook (*holds out hand*): Good morning, Mr. Pompous. I'm Surbrook of the Save-Time Machine Company.

Pompous (*shaking hands*): Ah yes, sit down won't you, Mr. —er—ah—Brooks?

Surbrook: Surbrook—thank you (*Starts to open his brief case*).

Pompous: Well, Mr. Suurball, I am afraid I won't have much time to spend with you this morning. I have a very important conference coming up.

Surbrook: We have a new machine coming out that I would like to show you. It is a great improvement over the one Mr. Logan is now using.

BAD (Contd.)

Pompous : Well, I should hope it would be. You people ought to be ashamed of such a piece of junk.

Surbrook : I am new in this territory, Mr. Pompous, but I know our company stands behind their products. I am sorry to learn that you have been dissatisfied.

Pompous : Well, I haven't got time to go into it this morning. Just leave your literature with me and I will study it and let you know my decision.

Surbrook : I would like to demonstrate it to the department head if possible, Mr. Pompous. Its ease of operation has to be felt to be appreciated.

Pompous (*interrupting*) : That won't be necessary. I make the decisions here. Good day Mr. Brooks.

(*Surbrook picks up brief case and hat and goes out*).

(*The scene shifts back to Pompous who smothers up great piles of paper and crams them into desk drawers*)

Pompous (*buzzes Secretary*) : I am leaving for the day, Miss Johnstone. Will you arrange the necessary postponements of the things on the docket for this afternoon. You don't need to say I am playing golf.

* * *

C U R T A I N

CONTROL OF FLOWING WATER

Britain to Build New Hydraulics Laboratory

By Dr. Trevor I. Williams

NO less than four-fifths of the earth's surface is covered with water, and almost the whole of this is constantly in restless motion — in ocean currents and waves, in falling rain, in flowing rivers and streams, and in eddies and whirlpools. Out at sea this unceasing movement is of little direct importance except to seamen, but wherever moving water is in contact with land its effects are prodigious.

Waves may erode the most rugged coastline or, alternatively, the sea can deposit so much silt that the coastline steadily advances. In Britain, for example, the ancient towns of Sandwich and Winchelsea which were flourishing ports only a few centuries ago, now lie more than a mile inland. At Winchelsea there is still a paid "coast-watcher" — an ancient office which has survived the changing conditions.

After heavy rainfall the rivers may burst their banks, submerging thousands of acres of land beneath many feet of water. Such forces as these are virtually irresistible, but engineers have learnt many ways by which the forces may be diverted so that they are spent harmlessly instead of endangering life and property, or are used to generate useful power.

From the earliest attempts to control the flow of water simply by opposing a solid barrier to it has grown the modern

science of hydraulics. The word in this sense means the study of how and why water in a mass moves in particular ways, and how the laws governing its movement can be turned to practical use.

SCALE MODELS

Hydraulics can be applied to real life problems in two ways. Either one can apply fundamental laws, discovered by laboratory experiments, directly to the problem in hand and obtain an answer by calculations, or one can prepare a practical scale model of the water system in question and see how this behaves under various conditions. This second method is usually the most helpful because the natural movements of water are usually influenced by so many different and changeable factors that calculations become very exhausting if one tries to allow for all of them.

Although Britain's practical problems in hydraulics are not so great as in some other countries, chiefly because by world standards the rivers are comparatively small, the Department of Scientific and Industrial Research set up a special organisation for hydraulics three years ago, and this is now being expended by the building of a big new laboratory on the banks of the Thames near Oxford. The new laboratory is expected to be finished within the next year.

The Scottish river Forth, for example, alone presents many questions, and at Teddington (near London) a scale model of this river has been made in order to answer them. Thus it is required to know how the flow of the river will be affected by the piers of the new road bridge which is planned. What will be the effect of deep dredging round Beamer Rock, or the entire removal of the Rock itself? How will silting be affected if the embankments are made to enclose wagons into which the dredged material would be dumped for reclamation?

RATE OF SHIFT

The estuary of the river Wyre in Lancashire poses rather different questions. Here the main difficulty is that, as shown by echo soundings, the deep water channel used by shipping is moving steadily eastward from its original position. A scale model is helping research workers to piece together the history of the estuary and determine the rate at which the channel is shifting.

The Thames, one of the world's famous waterways, despite its comparatively small size, although poetically reputed to "flow softly", in fact flows vigorously enough to make the engineer's task a difficult one. In the upper reaches, there is every year the problem of disposing of heavy winter rainfall without allowing the river to overflow its banks. Lower down, within the province of the Port of London Authority, the maintenance of a navigable channel and of sufficiently deep water

alongside many miles of docks is dependent upon unceasing interaction between the down-flowing current and the surges of the tide.

To calculate how the silt will be deposited from such a melée is virtually impossible, so again recourse has been had to large-scale models, three of which representing different sections of the river have been constructed at the Royal Victoria Docks in London.

TIDE-GENERATING MACHINES

A particularly interesting feature of these models, which is also included in a similar model of the river Severn, is a pneumatic tide-generating machine which reproduces exactly the rise and fall of the tide at any part of the river.

Fundamental research also is being carried on. Thus, special study is being made of the movement of solid particles in running water, a movement which the most casual observer must recognise to be of extreme complexity. Erosion of land by waves is also being studied.

The new laboratory now being built on the banks of the Thames will give a great impetus to all these activities. There, scientists will have far greater facilities and space than are at present available in Britain for this highly specialised kind of research. The new laboratory will include a wave-tank with a surface of 40,000 sq. ft., as well as a model river channel 12 ft. wide and 350 feet long.



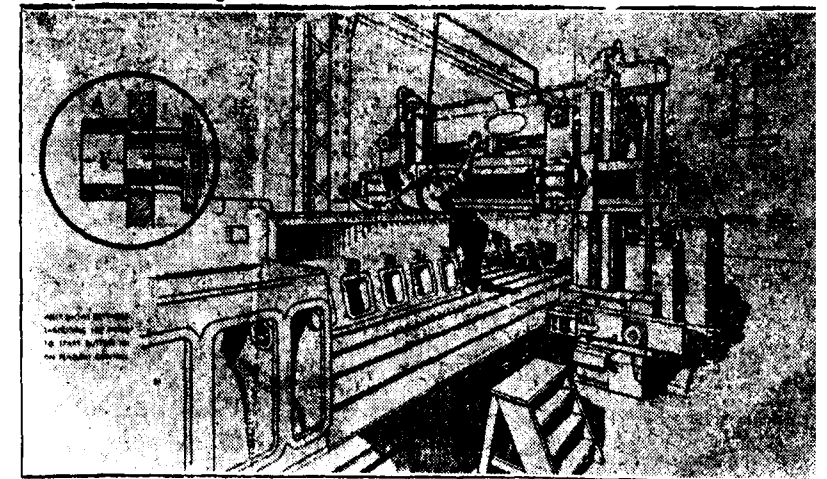
ACCIDENTS: HOW THEY HAPPEN AND HOW TO PREVENT THEM—Vol. 3 (New Series). April 50, Issued by the Ministry of Labour U. K. and obtainable from His Majesty's Stationery Office, 54, Grafton Way, London, W. 1. Price 9d. net.)

NOT all accidents are caused by thoughtlessness, of course; many factors contribute towards such unfortunate occurrences and these interesting pamphlets, clearly written and well illustrated, should do much to make the worker "safety-conscious" and management keen to see that all possible precautions have been taken to guard against similar or other happenings.

The contents of Volume 3 cover the following subjects: Prime Movers; Lifting Gear; Processing Machinery; Steam Plant; Celluloid; Transport; Electricity; Chemical; Building and Structural Work; The

Worker. These main headings cover 32 subsidiary titles, one of which (No. 10), "Dangers of Pendant 'Bottle Controls'" is fully described in the illustration accompanying this review.

A feature of modern machine tool practice is the provision of flexible pendant controls which enable a machine to be controlled by



The illustration was drawn by J. E. Stevenson Factory Department, and is reproduced from the pamphlet described above.

the operator from any convenient position. This facilitates close observance of the operations especially during setting-up. A risk associated with such controls is demonstrated by a fatal accident which occurred in the following circumstances. A planing machine was loaded with large castings and the setting was such that there was very little clearance between the leading castings and the tool bridge. Following a mishap with one of the tool boxes the operator was seen to pass from one side of the machine to the other by squeezing between the castings and the bridge with the pendant control held in front of his body. At that moment the table commenced to move and the operator was crushed and killed

(see illustration). It is surmised that he had his thumb over the start button and inadvertently pressed it, possibly through the pressure of his body. The start button had to be depressed $\frac{3}{8}$ " to engage the contracts and did not project beyond the adjacent beading on the casing. A shroud $\frac{1}{8}$ " deep has now been fitted round the button as shown in the inset. In addition the pendant control has been duplicated so that there is a separate control for each side of the machine and the possibility that a person may be induced to pass across the table in order to move the control from one side of the machine to the other is thereby obviated.



Question (1) To whose benefit House Service Connections are to be—that of the tenant or the house owner?

Answer: In these days, when electricity is in (short!) supply, the chances of getting new service connections are slightly difficult and mean a bit of money, too. Naturally a landlord would prefer to make a claim for the benefit of service connection in his premises, but the benefit should go to the person in whose name the service connection is registered in the books of the Supply Company. If he, the registered person, happens to be a tenant and as long as he wants the benefit of electricity in some place or in the same town or village, he can always arrange with the Supply Company to have the service main shifted at his cost to some other premises before his tenancy expires in the premises previously occupied by him and before he hands over "charge" to the owner or landlord. Where the tenant fails to notify his requirements before the premises are actually vacated, the next

occupant or the landlord gets the preference for the service connection already given to the consumer.

Question (2) It is widely believed that hand-pounded rice is better than milled-rice, and should be used in preference to milled-rice. Is there any method by which milled-rice can be made to have the qualities of hand-pounded rice?

Answer: The difference between hand-pounded rice and milled-rice chiefly lies in the vitamin content of the former. A bad name for milled-rice has been earned because of the excessive polish imparted to it by millers at the request of the consumers of rice. Milled-rice can also be made to reach up to the standard of hand-pounded rice, if too much of polishing is avoided. Rice can be just re-husked in the mill, whilst retaining at the same time its full grain value. It is not necessary to condemn milled-rice for this reason as it entirely rests with the huller to make it as good as hand-pounded rice.—S. S.

New Supplies: August 1950 was an eventful month for us; there were at least six switching-on ceremonies, during the month.

On Aug. 2, supply was given to the villages of Edayathumangalam near Lalgudi, and on Aug. 3—to Nachikuruchi near Tiruchirapalli.

In the first village, supply was rendered to 21 houses and to the local temple. A few street lights were also put up. A 30-kVA transformer installed for this purpose will also cater to the rice mill load of Mr. Varadaraja Iyer, who it may, incidentally, be mentioned here, gave us all a "good feed" on the occasion of the formal ceremony.

Mr. H. K. Ramaswami, Dy. Chief Engineer, switched on the supply. About 18 spans of H. T. lines tapped off the Lalgudi feeder, a pole-mounted 30-kVA substation and L. T. lines comprise the technical side. Our congratulations to the Engineering Department for taking supply to yet one more village.

Closely following this came supply to Nachikuruchi village on Aug. 3. Besides a few street lights, 12 houses have also been connected up.

Mr. R. Seshadri Iyengar, a prominent member of the Tiruchirapalli Bar switched on the supply.

Mr. Raja Chidambara Reddiar, President, District Board, Tiruchirapalli, who presided at the function, exhorted the villagers to put electricity to good use. The District Board President said a few nice things about the Corporation, and congratulated it on its pioneering effort in electrifying rural centres, despite the job being un-remunerative.

Probably, the most important rural electrification scheme, undertaken during recent times came off on Aug. 22, when Mr. P. S. Kumaraswami Raja, Chief Minister, Government of Madras, switched on electric lights in the Vedaraniyam Panchayat area comprising 14 sq. miles.

Mr. M. Bakthavathsalam, Minister for Public Works, presided.

Urging the people to use electric power for increasing food production, Mr. Bhaktavatsalam said that the first part of the Mulliyar irrigation project was over and that about 1,128 acres of *Nanja* lands had been brought under irrigation. When the whole project was completed, he added, about 6,000 acres more, would benefit.

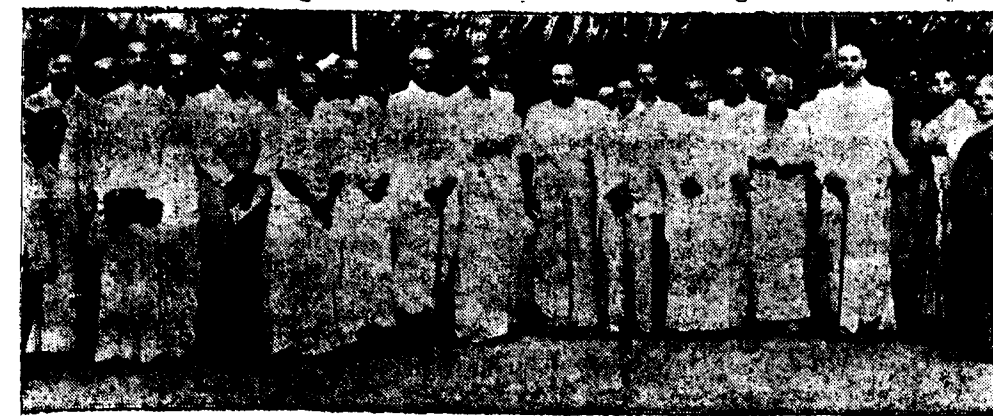
Mr. P. S. Kumaraswami Raja said that Messrs. Seshasayee Brothers Limited (Managing Agents of this Corporation) practically laid the foundations of the present Madras Grid. But for their enterprise, he continued, it would not have been possible to take electric power to rural areas.

might not have launched on their ambitious irrigation projects! The Sardar also paid a glowing tribute to Messrs. Seshasayee Bros. for all their good work in the field of rural electrification.

Mr. S. Vaidyanatha Iyer endorsed the sentiments of the Chief Minister with regard to the need for developing agricultural and industrial loads.

Mr. V. Seshasayee, in the course of a brief speech, referred to the conspicuous part played by Sardar A. Vedaratnam in bringing electricity to the area. He appealed to the people to use electric power for agricultural purposes.

Earlier, the Ministers and other guests were entertained to tea by Mr. Seshasayee.



"Switching-on" at Vedaraniyam

Sardar A. Vedaratnam, who also addressed the gathering, said that the present famine conditions indeed constituted a blessing in disguise; but for those conditions probably Government

On Aug. 16, supply was given to the agricultural pump-set of Mr. S. A. Naganatha Iyer at Kachathanallur in East Ramnad Area. A 10-kVA substation was erected for the purpose.

Supply was given to the rice mill of Mr. Sivaswamy Udayar at Velayuthapuram (Lalgudi) on Aug. 24, by the provision of a new 30-kVA transformer substation.

The agricultural pump set of Mr. Subban Ambalagaran was connected up at Kadapatti village near Viralimalai, Pudukottah Division, on Aug. 30. A 15-kVA transformer substation was installed for the purpose.

New Rice Mills :

During September rice mills connected include :

<i>Village</i>	<i>Owner</i>	<i>Technical details.</i>
1. Karattampatti	Mr. P.S. Arumugam Chettiar	A new 30-kVA transformer substation
2. Neikuppai Lalgudi Taluk	Mr. K. Pichaikutti Udayar	do
3. Thohur near Tirukattupalli	Mr. T. N. Muthusamy Chettiar	L. T. extensions.

Railway Stations :

Railway stations electrified during July-September are: (1) Kambarasam-pettai and Ariyalur in the Tiruchirapalli-Srirangam area and (2) Malliyam in the East Tanjore area.

System improvements :

As an improvement to the existing system and to cater to present loads better, two new 50-kVA substations were recently erected—one at Crawford (Tiruchi) and the other at Mayavaram.

Current TOPICS

KASHMIR SCHEME :

It is learnt that the Government of Kashmir have commenced work on a new hydro-electric-cum irrigation project. The scheme aims at harnessing the power potential of the River Sind, a tributary of the River Jhelum, and carrying the water required for seasonal irrigation and power generating purposes through a masonry-lined canal to Ganderbal, 13 miles from Srinagar.

DRY BATTERY INDUSTRY :

The Government of India have accepted the Tariff Board's recommendations on the continuance of protection to the dry battery industry. It is learnt. Steps have been taken to extend the protective duty of 30 per cent *ad valorem* on imports up to 1951. The Government have also accepted the recommendation that the control over imports of dry batteries should be maintained only as long as such restrictions are necessary for the conservation of foreign exchange.

LIGNITE DEPOSITS IN MADRAS :

The exploitation of the 500,000,000-ton-lignite-(coal) potential, in South Arcot district, hampered by underground rush

of water at present is expected to be carried on without interruption by the sinking of artesian wells in the area.

With this object, the Madras Government recently gave approval to a scheme of sinking 100 such wells there, estimated to cost Rs. 4,00,000.

In addition, these wells would serve to irrigate and bring under cultivation some 3,000 acres of land nearabouts the lignite area.

PRODUCTION OF ELECTRIC LIGHT BULBS :

The total number of electric light bulbs manufactured in India is almost equal to that of bulbs imported from abroad, mainly from Britain. In 1949, a total of 13,560,000 bulbs were made in India, against 9,246,350 in 1948 and 7,620,000 in 1947. In 1948/49, a total of 13,482,024 bulbs were imported, against 12,364,622 in 1947/48.

The present installed capacity of the industry is 18,000,000 bulbs a year, but so far this figure has not been reached. Of raw materials required by this industry, only glass-shells are made in India. Main items which have to be imported include :

lead in wire, molybdenum wire, tungsten filament, brass caps, mandril wire, and argon and nitrogen gas. Steps are being taken to manufacture locally some of these components; brass caps, for example, are now going into production, at several plants.

RIVER VALLEY PROJECTS :

A review of the activities of the Central Water-power, Irrigation and Navigation Commission during 1949-50 shows that the most important work done during the year related to the Hirakud Dam project in Orissa. The C. W. I. N. C. has been entrusted with the construction of the Kakrapara Weir and Canal Projects on behalf of the Government. It is stated that the construction work on Stage I of this project has already been started, and that it is expected to be completed in three years.

It is also stated that the investigations of the Kosi Project are said to be nearing completion, and that detailed investigations on the Narbada, Tapti, Sabarmati, Assam, Coorg and the Madhya Pradesh Projects were continued, although during the latter part of the year activities had to be slowed down for want of funds.

INDIAN TELEPHONES :

India is expected to become self-sufficient in telephone equipment within three to four years' time Mr. Krishna Prasada, Director-General of Posts and Telegraphs, Government of India, stated recently. He said that at present the actual manufacture of parts of the telephone was not

being done in India, but parts were being imported from foreign countries and assembled at the works of Indian Telephone Industries, Ltd., at Bangalore. The Government also intended to arrange for the manufacture of tele-printers, but no beginning has been made as yet.

BOMBAY GRID SCHEME :

One hundred and forty villages in Gujarat will soon have a supply of electricity under the North Gujarat Grid scheme, the construction of the 66,000 V line from Ahmedabad to Baroda, Bombay Province, having been completed. In addition to domestic use, power will be made available to small-scale and cottage industries and the working of some 700 to 800 agricultural pumps.

'ORTO' TRANSFORMER OIL :

The Line Material Company, U. S. A. announces a new development in transformer oil (Trade Name ORTO) claiming specific resistance to oxidation, acidification and sludging. The 'Inhibitor'—a sort of catalyst with a negative action—mixed in the transformer oil, is said to prevent the oil from oxidising, preventing the later formation of acids and sludge. The ORTO brand oil, it is stated, lasts several times as long as a high-grade conventional oil, and offers an improved overload capacity, a longer transformer life and lower maintenance costs.

JOINTS AND CLAMPS FOR ALUMINIUM CONDUCTORS :

An article in a recent issue of LINE is of much topical interest to engineers

in this country as aluminium conductors are rapidly coming into use.

"As Aluminium receives wider acceptance as a conductor material, the special problems encountered in connecting aluminium conductors to aluminium or copper connections take on additional importance". Seven years of investigation work reveals the following very interesting points, according to this article.

Joints in transmission lines are expected to possess high electrical conductivity and mechanical strength and to retain both qualities for the entire life of the conductor

A well-made joint should ensure :

- (1) that the jointed ends are in intimate contact,
- (2) that the resistance of a certain length of the jointed portion should be the same or even less than that of a same length of an unbroken conductor.
- (3) that, over a period of years, this resistance ratio does not increase due to oxidation of the conductor at the joint.

Twisted or hydraulically compressed sleeve joints maintained satisfactory resistance values over a period of seven years; cleaning the conductor ends and sleeves with sodium hydroxide and dipping the sleeves in NO-OX-ID in addition, gave better results. Thus specially cleaned twisted sleeve joints showed a resistance stability equal to that of the best compression joints.

Where a copper connection is required to be made off the aluminium conductor, a suitable separator has to be used between aluminium and copper to avoid or minimise the growth of contact resistance due to electrolytic and consequent oxidising action. For the investigation, several types of separators were used and the resistance between the separator and each conductor was measured at least once in a year. The separators tested were aluminium, copper, copper-plated with zinc or cadmium and copper hot dip galvanised. The most satisfactory separator was found to be a massive piece of aluminium dipped in NO-OX-ID as it maintained a low overall electrical resistance of the connection. A U-bolt clamp connection between the aluminium and copper with a sufficiently large piece of aluminium separator in between was a common form of connect-up.

A. C. S. R. MANUFACTURE :

With reference to the article on "Aluminium Industries, Kundera" published in our last issue, the Manager of the National Insulated Cable Company of India, Ltd., Calcutta writes:—"May we bring it to your notice that the National Insulated Cable Company of India Ltd., have already been engaging itself in the Manufacture of A. C. S. R. and in fact had started supply of this material since early this year to some State Governments?"

Strictly Personnel

Mr. V. Seshasayee :

"All the romance of electricity is not in the story of its pioneers, nor in the adventures of scientists probing the invisible world of electrons", says a recent booklet issued by a well-known American Electrical Company.



Mr. V. SESHASAYEE replies to addresses.

Twenty-five years ago, in this part of the country, some of it, at any rate, seemed to consist in wearing down one's shoe-leather — and the sales resistance of an apathetic public — to electricity.

If the people of Tamil Nad are today "sold" on electricity, it is chiefly because of the pioneer work of Mr. V. Seshasayee and his cousin the late Mr. R. Seshasayee.

Occasion for reminiscing about Mr. V. Seshasayee in these columns is his *Shastiabdapurti* (sixty-first birthday) which came off an August 12.

At a largely-attended public meeting at the Power House, presided over by Dewan Bahadur S. Raghava Iyengar, Chairman of the Celebration Committee,

several addresses were presented to Mr. Seshasayee — including one for and on behalf of the staffs of all his various organisations.

The public address was read by Dewan Bahadur N. Ramaswami Iyer, one of our leading citizens and a prominent member of the local bar, and the general staff address — by Mr. M. Periaswami of our workshops.

The former contained a reference, among other things, to the Technological Institute proposed to be started in Tiruchi, in commemoration of the auspicious occasion.

'We'll teach you to manicure, model and mime

Keep poultry, bees, barges and books.

Would you care to make wigs?

or corsets? or gloves?

Is your urge towards chemists or cooks?

Do you want to learn wrestling?

or welding? or Welsh?

Gemmology, gilding or Greek?

Is fuel your forte? or foundry? or furs?

'There's an L. C. C. class every week'

sang a member of the editorial staff of the *London Times*.

Whereas, in India, we do not have even an adequate number of polytechnics and institutes offering instruction in more essential courses of study like Engineering.

Response to the appeals issued for funds has been most encouraging, but the project being what it is, the sponsors could do with a little more money. Will all those inclined to help kindly get in touch with the Hon. Secretary, Seshasayee Shahstiabdapurthi Technological Institute Committee, Power House, Tennur, Tiruchi?

* * *

Rao Saheb K. E. Chidambara Iyer :

The death occurred on July 23 of Rao Saheb K. E. Chidambara Iyer who succeeded Col. Sir T. Desikachariar as Chairman of Board of Directors in the year 1940. For ten years now, he had been piloting the affairs of the Corporation with great distinction.

Careful and conscientious, he was a jealous champion of the rights of shareholders and the interests of staff and consumers.



Beneath a brusque manner, he concealed one of the warmest of hearts, and, in his death, we have all lost a good, wise and esteemed friend.

We extend our most respectful condolences to the members of the bereaved family.

* * *

Mr. Manickam :

Death occurred under tragic circumstances of one of our fusesmen, Mr. M. Manickam Pillai, on August 20. While attending to a fuse-off call, he fell down from his post, evidently due to shock from contact with a live wire. He was immediately taken to the Headquarters hospital, but he died in the evening.

The saddest part of this tragedy was that Manickam, who had behind him 12 years' experience on live-line working, should have ignored the fundamental pre-caution of using his safety appliances—gloves and lineman's belt—despite the fact that circulars are frequently issued to all staff drawing their attention to the necessity of observing safety rules.

We extend our deepest sympathies to the members of the bereaved family.

Farewells :

Mr. N. V. Rajam Iyer, Resident Engineer, who went on leave a year ago has since resigned. It is learnt that he has now joined Messrs. P. Natesan & Co., Ltd., Madras. Whilst with us Mr. Rajam Iyer was responsible for several extensions in the East-Ramnad and East-Tanjore area.

Mr. V. Rajagopal, Chief Accountant, resigned with effect from October 3, to join the Government Electricity Department as Chief Accountant, Papanasam Hydro-electric System, Mathurai.

So has our Internal Auditor Mr. S. K. Ramamurthi. He too has joined

Government as Chief Accountant, Andhra Power System, Bezwada.

On the eve of their departure, staff of the Accounts Section and a few other friends got up in their honour a grand (rice-less) dinner.

Mr. Rajagopal has been with us for a little under thirteen years and his several friends in office will miss him greatly.

A "hail-fellow well-met" type, Mr. Ramamurthi was quite a popular figure—notwithstanding his short stay with us.

Our good wishes go to both in their new career.

We would also like to take this opportunity to welcome our new Chief Accountant Mr. V. Balasubramanian, a chartered accountant who was formerly with Mr. S. Vaidyanatha Iyer of New Delhi.

Mr. A. Venkatapathy Mudaliar, Bill Collector, retired from service with effect from September 22. He has to his credit a service of 22 years. We wish him many long years of health and prosperity.

Canteen :

The sugar position in our canteen now being satisfactory—thanks largely to the untiring efforts of Mr. B. Anantha Padmanabhan, a member of the canteen sub-committee, our morale has now hit a new high.

Not merely a purveyor of good food, the canteen is now a centre of sociability, jollity and much friendliness.

—B. P.

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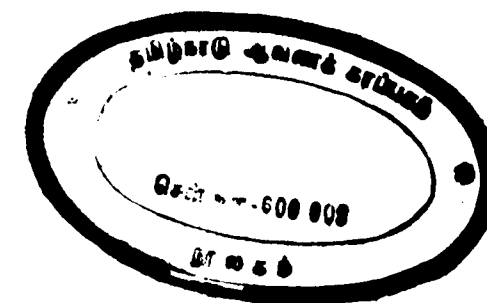
FOOD FOR THOUGHT . . .

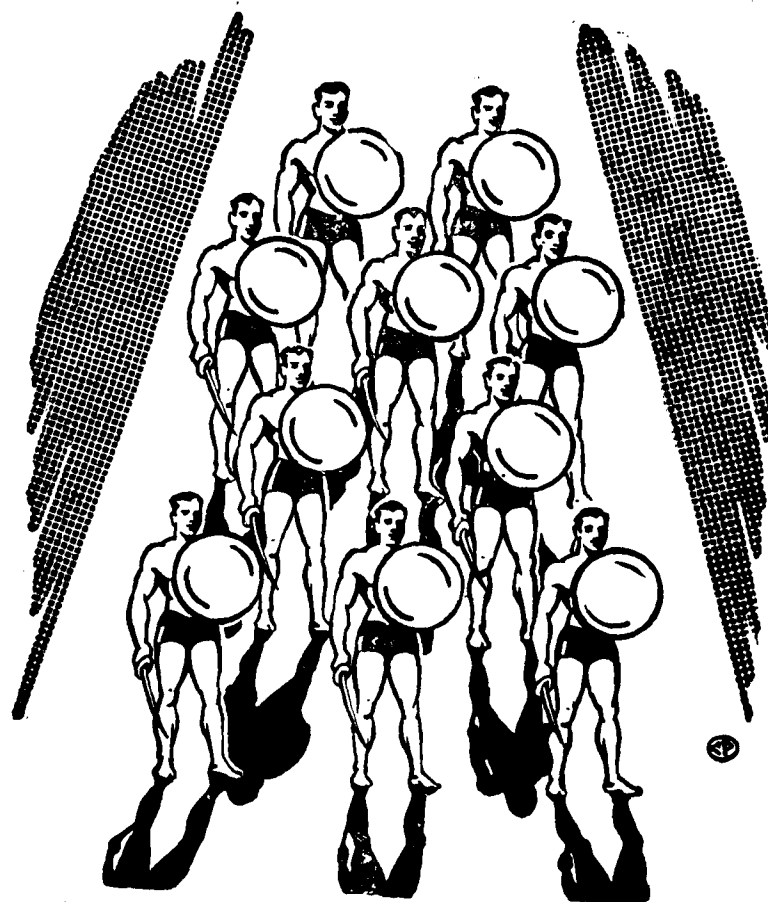
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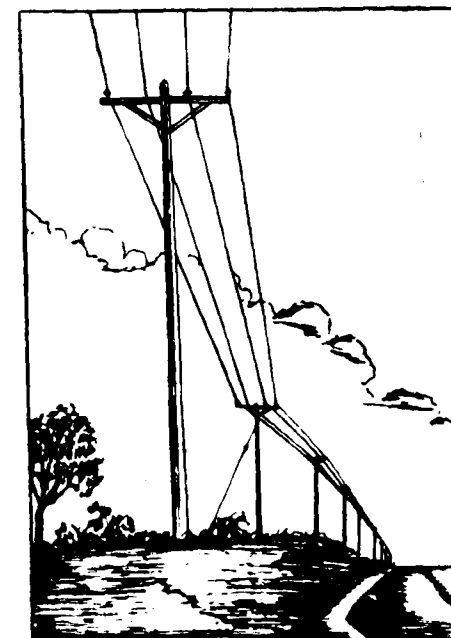
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