

4216

Rail Coach

Vol. III, 1958 No. 1, 2.

Oct. 1958, Nov. 1958

DL
DS75m211.P, NS7RE.
NS8.3-1.

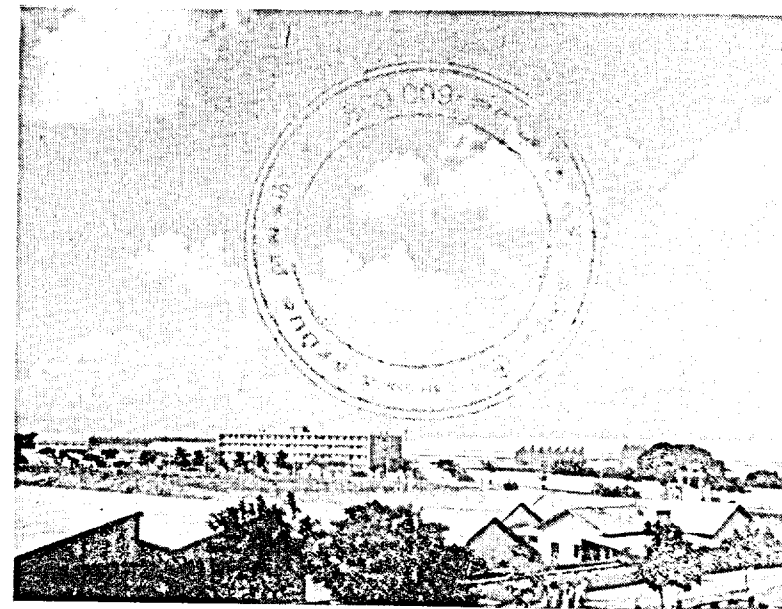
129169

639

JL
D515 10011. P, NS7R2

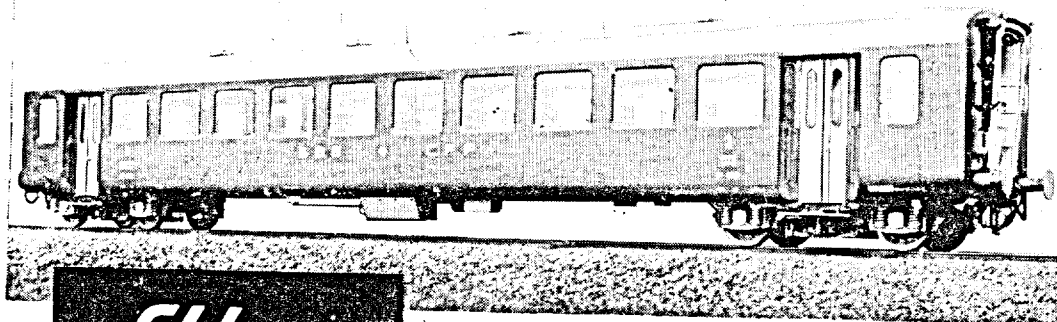
N52. 8.1

129169.



VOL. III, No. 1

ANNUAL NUMBER

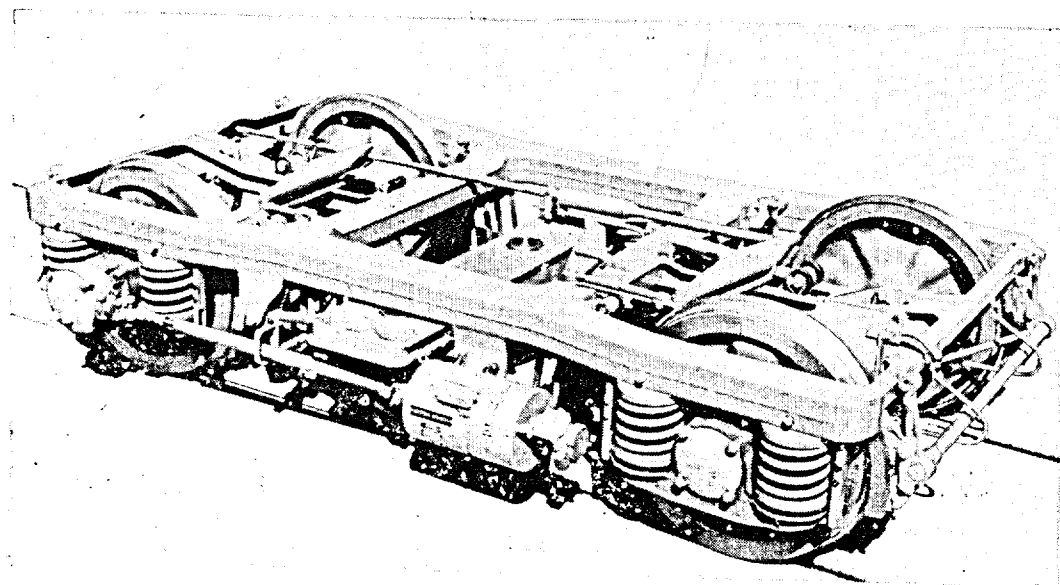


Latest Standards light weight
steel coach built by SCHLIEREN
for the Swiss Federal Railways

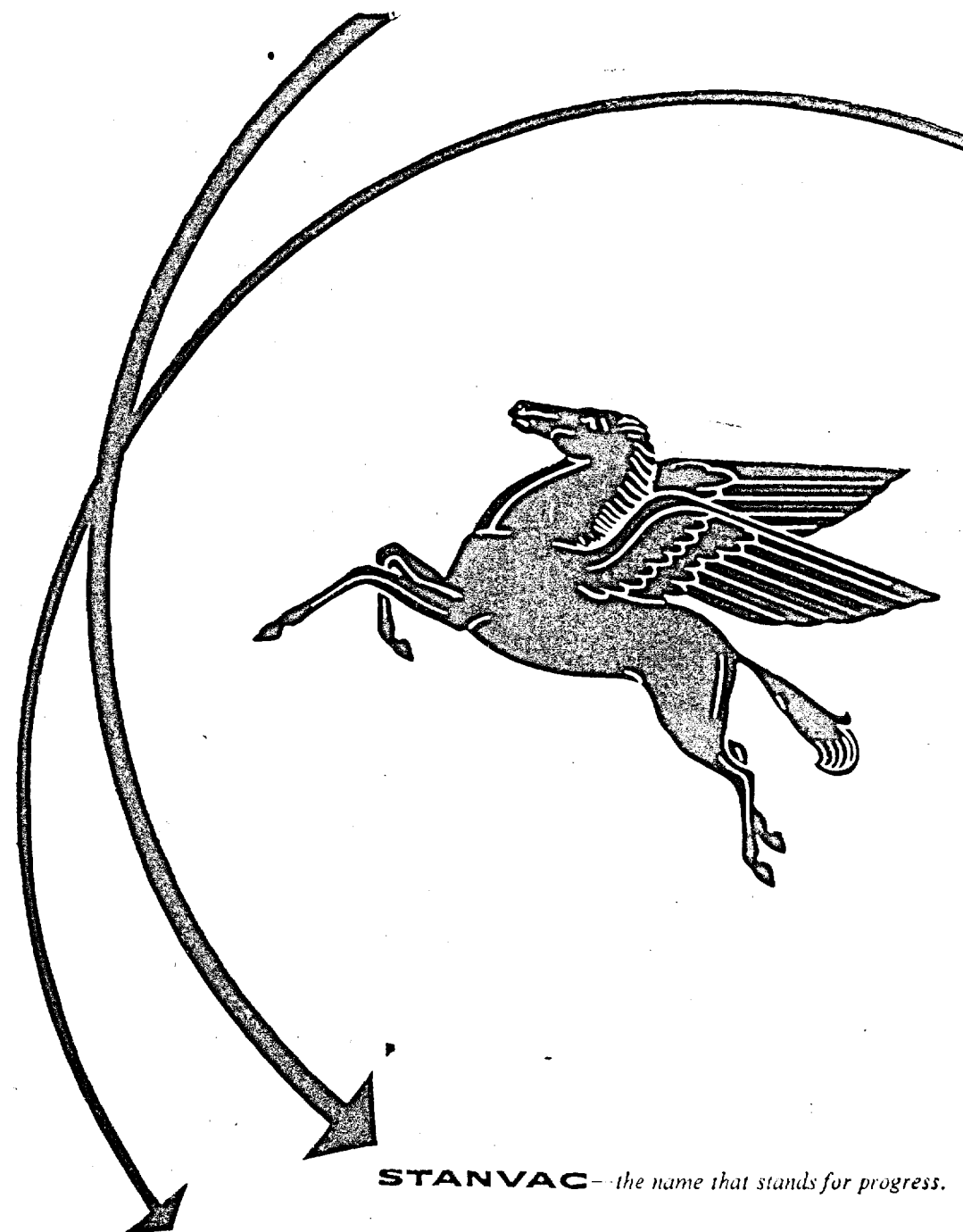
Length over buffers: 23.7 m;
Tare weight: 26 tons;
Seats: 80.

The air-heating plant is com-
bined with press air-ventilation
for summer-service.

This coach is equipped with the
latest bogie type SCHLIEREN
with helical springs tested up
to a speed of 80 m/h.



Swiss Car and Elevator Manufacturing Corp., Ltd., Schlieren-Zurich (Switzerland)



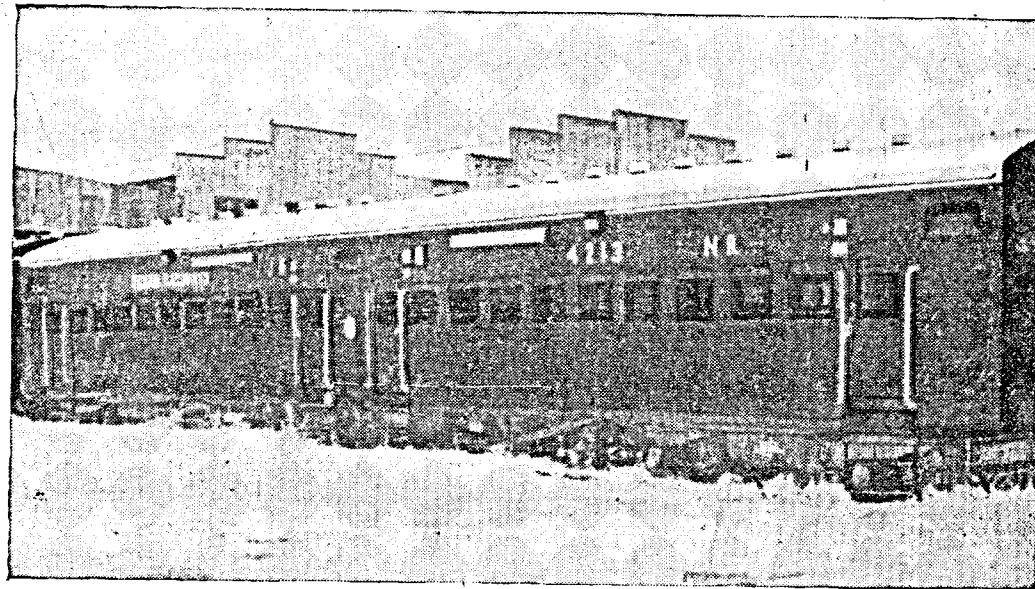
STANVAC—the name that stands for progress.



STANDARD-VACUUM OIL COMPANY (Incorporated in the U.S.A., with Limited Liability)

PSVOC-2136

The Superfine SPARTAN *in the service of* **INDIAN RAILWAYS**



(One of the Coaches—a H. A. L. painted with SPARTAN Finishes)

Passenger Comfort in Travel:

That is the slogan of the Railway Board during the Second Plan period to the millions of travelling public who use Railways.

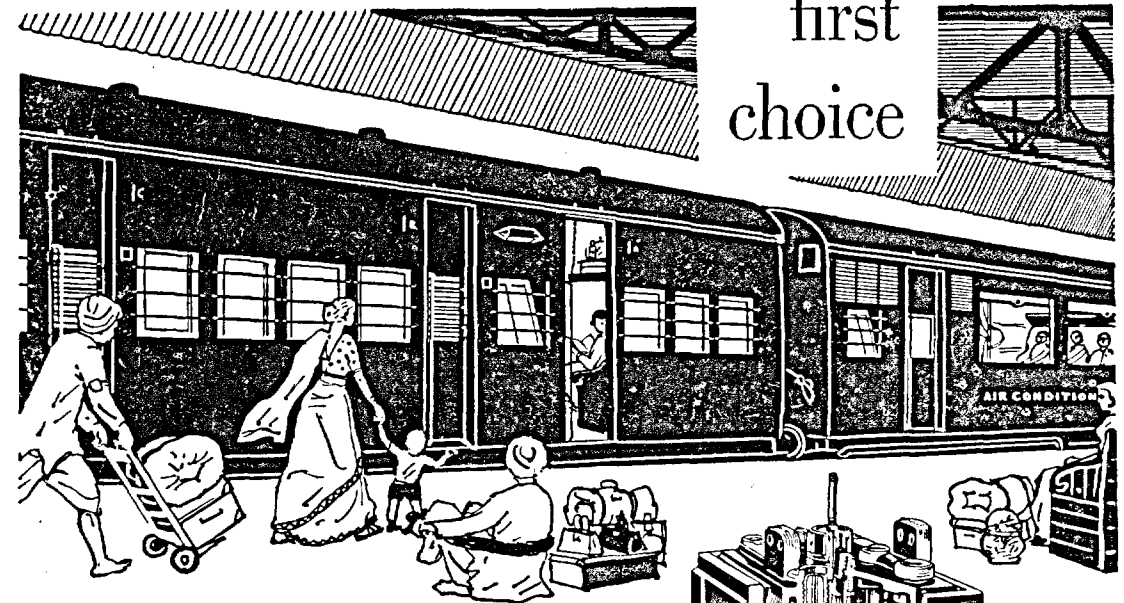
Pleasure to the eyes is a soothing comfort and colour affords it. The excellence in performance of SPARTAN DURAFLEX SYNTHETIC ENAMELS renders added comfort to the passengers travelling in the coaches built in our country to-day.

ADDISONS PAINTS & CHEMICALS PRIVATE LTD.
SEMBIAM MADRAS 11

Manufacturers of:

Automobile Lacquers, Synthetic Enamels, Ready Mixed Paints,
Plastic Paints, Varnishes and other Motor Accessories

the
first
choice



Proved in day and night service throughout the Indian Railways for many years now, Exide-Ironclad Batteries are the first choice of progressive railway engineers. Manufactured at Exide's modern factory at Shamnagar, near Calcutta, Exide-Ironclad Batteries are today fitted on most railway coaches to provide power for lights, fans and air-conditioning. Constant research and quality control at every stage of production make Exide-Ironclad the battery which combines long life and high electrical efficiency with light weight, ideal voltage characteristics and the minimum of maintenance requirements.



Exide-Ironclad

for train-lighting, fans and air-conditioning

CHLORIDE & EXIDE BATTERIES (EASTERN) PRIVATE LTD.

EBSC-26

JENSON & NICHOLSON

MAKERS OF ROBBIALAC

CARBORUNDUM UNIVERSAL LTD.

Manufacturers of
High Quality Bonded &
Surface Coated Abrasives.

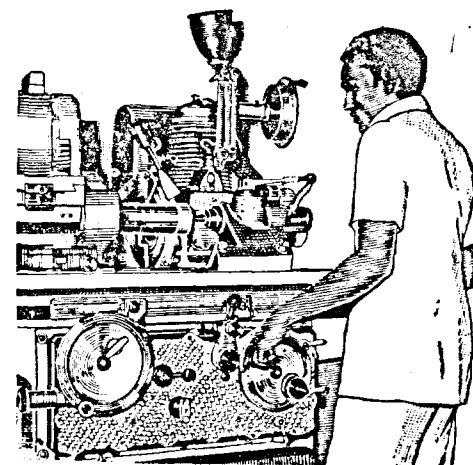
SURFACE COATED ABRASIVES

FLINT, (SAND), GARNET, EMERY, ALO-
XITE, SILICON CARBIDE, ROLLS, BELTS,
DISCS, REAMSTOCK, IN PAPER, CLOTH,
COMBINATION, ETC.



BONDED ABRASIVES

GRINDING WHEELS, SEGMENTS,
RUBBING BRICKS, STICKS,
SHARPENING STONES, VALVE
GRINDING COMPOUND, ETC.



CARBORUNDUM UNIVERSAL LTD.,

Office: "SWASTIK HOUSE" 106, Armenian Street, MADRAS-1
Telephone: 2941 (4 lines) Telegrams: "CUMI"

CUZ-29

Works: TIRUVOTTIYUR.



DISTRIBUTORS FOR COATED ABRASIVES:

For Madras, Pondicherry, Andhra Pradesh, Mysore & Kerala States

M/S. R. SUBBARAMAN & CO. (Private) LTD.

Vanguard house, 11/12, Second Line Beach, Madras 1

Branch: 141, Rashtrapathi Road, Secunderabad

DISTRIBUTORS FOR BONDED ABRASIVES:

M/S. WILLIAM JACKS & CO. LTD.

Calcutta 1, Bombay 1, Madras 1, New Delhi, Bangalore, Kanpur

M/S. SCOTT & PICKSTOCK PRIVATE LTD.

• Calcutta 1, Bombay, 1, Madras 1, New Delhi, Bangalore, Kanpur, Hyderabad Dn.

M/S. H. S. COX & CO. PRIVATE LTD.

24, Rampart Row, Bombay (For specialities only)

HINTS TO PASSENGERS

The Railways are spending a lot of money on providing amenities for the travelling public, especially third class passengers.

You are requested to make full use of these amenities and also to see that they are properly used and kept clean as far as possible.

★ PLEASE ALLOW PEOPLE TO GET DOWN FIRST FROM TRAINS

The doors of railway compartments are just wide enough to allow one person at a time, to get in or get out.

Wait for passengers to detrain and then you entrain avoiding confusion at the doorway.

★ FORM THE QUEUE HABIT

You will be served more expeditiously if you form the queue habit.

★ DO NOT ENCOURAGE HAWKING AND BEGGING

It is up to you to discourage hawking and begging in railway premises by refusing to buy or give.

WESTERN RAILWAY

SAGE OF SABARMATHI

BY

V. E. THIRUVENGADIAH,

(Sub-head Accounts, N. J. O. Madras-23.)

Although the world is full of writ
On our Apostle of Truth, exquisite,
Yet I deem as my life's duty
To thank him aloud for his great bounty.

Wise Socrates of wistful Greece,
Serene Siddhartha who soiled under trees,
Father Abraham of foreign land,
A host of best of our soils band,

Of these perhaps *he* creamed in one
And sent a Saviour without Bren-Gun
Anointing with oil of "Non-Violence"
To aid our struggle for Independence ;

Of slender frame and tenderest heart,
Devoted to Truth and dedicated to part
The pleasures of life. He lived in love
Preaching Ahimsa with palms held above.

Krishna, Christ or Ram or Rahim
As All in One he prayed to *him*.
Spread Lord's psalm of Love for Hate !
Cowed our Nation's distrust in spate.

With groundnut diet and goat milk drinks,
Half-naked abandoning silks
Preferred Third class though 'Reserved' offered
Led simple life as poor Indian could.

Weeded off Harijans' woes and wail
And pleaded human rights, tooth and nail.
" Hang old Gandhi on a sour apple tree."
Of them so mused he *endeared* in glee,

Courted jails for our Country's cause,
Fasted times for Hind-Muslim peace,
Feasted best in fine Ram-Dhun
And parted last in Martyr's "Run."

Khadi of Charka, a cottage industry
Cleverly he developed, quite mystery

And rid of the layman's sheer requirements
To make both ends meet at dire moments.

"History repeats itself," is the saying
But history of ours is queer, in having
Wrought our freedom by ruthless measure
By Bapujee's lead,—Our bemoaned treasure!

Dauntless he marched to Dundee on foot
Defied alien rule and shook the very root
When the salt of sea was covered as own,
A fantastic fun, accredited by none.

His courteous slogan of 'Quit India'
Has done a great miracle 'Deo Gratia'
Spread like fire and melted the hearts
To withdraw the yoke at the passive resorts.

Asked once when in an alien land
Was he Mahatma with any magic wand
Softly he replied in subdued tone
That names he had none but "Daridranarayan."

Of the name Gandhi is Truth manifest
Saint, Statesman yet simple of rest
Lived in our age and risked for us.
What a sinful lot! to have lost him thus.

Second October of every year
Sacred to all very far and near
To offer our prayers in solemn mute
And crush the 'Ego' with fresh resolute.

Though hard to practise what many preach
But still let us try for a nearer reach
His footsteps leading to God of Truth
Thus appease his agony of soul forsooth.

"Father of Nation, that shown us the way
Sovereign of heroes, selfless, ever gay
Our grief at your loss knows no arrest
Yet peace unto thee; for praise thou detest.

"Oh, beloved Kasturbha's Pathee!
Sagacious Sage of Sabarmathi!
In honour of your service to humanity
Permit to dedicate this petty poetry."



MESSAGE FROM THE CAO(R)

We have passed another eventful year and our performance during this year can be considered to be most satisfactory from all standards. I must congratulate all the workers of the Factory on this performance and the devoted and loyal service which they have put in.

The *Railcoach* has played its own significant part in the achievements of the Factory. The various technical articles and articles on human relationship have helped in building up a good team-spirit in the Factory. The latent talents in our staff in art, literature, etc., are also being developed. The popularity of this magazine has been steadily growing and I hope very soon every home in the I.C.F. Family will be eagerly looking forward to every new issue of the *Railcoach*.

The strength of the I.C.F. Family has grown from 3,500 on 2nd October 1957 to about 6,000 on 2nd October 1958. During the year, therefore, the family has prospered, and I have no doubt that it will prosper further in the next few years. To cater to the different taste of such a large family is the arduous and assiduous task of the *Railcoach*.

It is proposed to intensify the editorial board to cater to the varying requirement of this huge family, and I am sure that in the coming years the *Railcoach* will even be more interesting than what it has been hitherto.

Through the medium of *Railcoach* I would like to extend to all members of the I.C.F. Family my warmest greetings, and on behalf of you all, I have the pleasure to extend our thanks to the Principal, Technical School and staff associated with the *Railcoach* for the splendid work that they have done in the past year. I would also request all the members of the I.C.F. Family to contribute generously to this house magazine in order to develop better understanding and to make this magazine a medium to discuss problems of mutual interest.

K. SWARUP
Chief Administrative Officer

CHANDA PAINTS

FOR QUALITY & ECONOMY
FOR BETTER COVERAGE

IN WIDE AND VARIED USE THROUGHOUT OUR COUNTRY
BOTH FOR INTERIOR AND EXTERIOR PURPOSES

RENOWNED FOR DURABILITY AND FINISH

"INERTOL" PAINTS

For Iron Concrete, & Steel — the best aseptic water proofing
compound — for use on Piers, Quay Walls, Foundations
Granaries, Locks, Lock Gates, Cranes and etc.

INERTOL PAINTS ARE USED ON EVERY COACH THAT LEAVES THE
INTEGRAL COACH FACTORY

MANUFACTURED BY:

Messrs. P. C. Chanda & Co. Ltd.
CALCUTTA

Represented in the South including
Madras, Mysore, Kerala & Andhra Pradesh

By

The South Indian Export Co. Ltd.

20 General Patters Road Madras 2

Telegrams : Dieselage Madras

Telephone : 84127

RAILCOACH

(INTEGRAL COACH FACTORY MAGAZINE)

EDITORIAL NOTICE

All contributions must be clearly typed and doublespaced on one side of the paper only, and signed, not necessarily for publication, but as a guarantee of good faith.

Manuscripts and photographs, not accepted for publication, will not be returned unless the sender so requires. Intending contributors from outside our Factory, if they intend to get back unaccepted articles and photos, should send a suitably stamped and self-addressed envelope along with the material sent by them.

Contributions should be addressed to the Editor, not by name, and reach him not later than the 25th of every month for consideration for publication in the next month's issue.

The Editor does not assume any responsibility for the accuracy of the news supplied by correspondents or for opinions expressed by contributors. Opinions expressed in the "RAILCOACH" whether editorially or by contributors should be regarded as having no official authority.

Annual Subscription ... Rs. nP.
3 00

CONTENTS

OCTOBER 1958

	PAGE
Sage of Sabarmathi	7
CAO(R)'s Message	9
Editorial	13
Institution of Locomotive Engineers' Award to Shri Swarup	14
What's News...and why	15
The Engineer as a Citizen	19
Agreement for World Bank Loan for Expansion of Railways	23
Message of Greetings to the Workers of the I.C.F. on the conclusion of the Third Year of Production	25
Role of Supervisors in Industry	27
CAO(R)'s Circular on Suggestions and Inventions Scheme	35
The Social Responsibilities of the Industrial Engineer	37
Highlights of Third Production Year	41
Shop Safety	49
IGY and the Satellite Programme	51
Your Doctor needs help	59
Visitors to the Factory	63
Role of Soils in Gardening	64
"Inverse in Verse"	68
A Cadet's Holiday at Home	70
On Cooks	75
Brain Teasers	78
Wit and Whistle	79

Cover—The Administrative Office with the Factory in the rear as viewed from the Technical School.

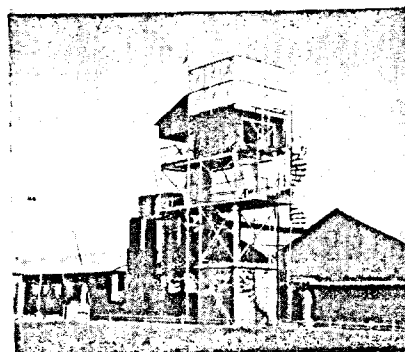
PROTECT STEEL WITH ALUMINIUM

Good quality aluminium paint is not only bright and attractive in appearance: it is superior to all other paints in combining excellent resistance to the weather and to many types of corrosive atmosphere, high reflectivity to light and heat, and good hiding power; it is unsurpassed in the protection it affords to all kinds of surfaces and, not least, in economy of use.

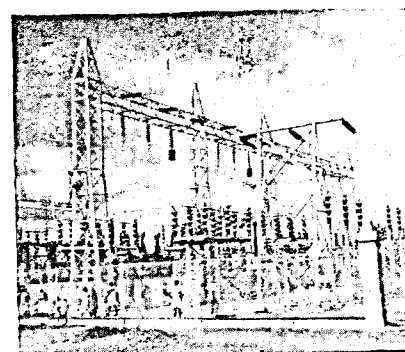
To prevent the corrosion of steel there is no maintenance system better than a complete aluminium paint treatment.

There are aluminium paints specially prepared for primary as well as finishing coats on steel. Ask any paint manufacturer for composite aluminium primer and general purpose aluminium paints.

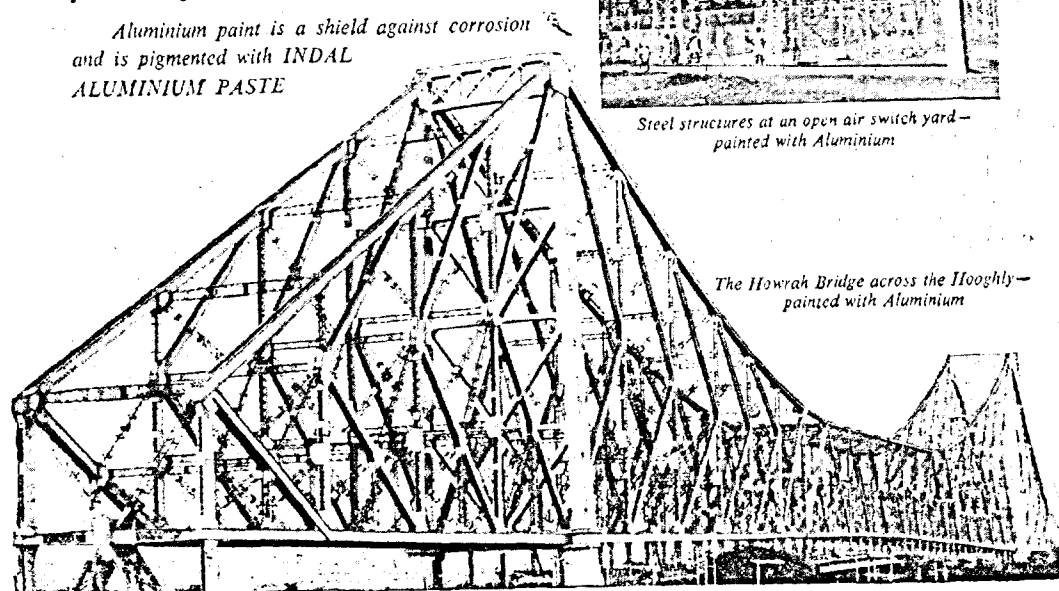
Aluminium paint is a shield against corrosion and is pigmented with INDAL ALUMINIUM PASTE



*Overhead water storage tank—
painted with Aluminium*



*Steel structures at an open air switch yard—
painted with Aluminium*



*The Howrah Bridge across the Hooghly—
painted with Aluminium*



Indian Aluminium Company Limited

A CANADIAN-INDIAN ENTERPRISE

Head Office: 31 Chowringhee, Calcutta 16

Branch Sales Offices:

CALCUTTA
30 Chittaranjan Avenue

BOMBAY
Lotus House
Marine Lines

NEW DELHI
44 Janpath

MADRAS
Agurchand Mansion
35 Mount Road

IAS 1978

RAILCOACH COMPLETES TWO YEARS

The Railcoach, which first appeared as a priced magazine in October 1956, has completed yet another successful year. The magazine is well established and its finances are sound. The happy position that prevails to-day is no doubt due, besides His grace, to the good wishes and active support of the members of the ICF family and the numerous advertisers. As expected the staff of the I. C. F. have enthusiastically participated and have more than lightened the burden in bringing out the magazine. More and more articles are being contributed confirming the original belief that there is neither dearth of talent nor interesting subjects to publish in the I. C. F. Assured of the continued and whole-hearted support of its well-wishers, the Railcoach cannot but enter the third year of existence with confidence, rededicating itself to the service of its readers.

The Railcoach is truly a magazine of the I. C. F. family, run for and by the family. However, in the matter of running the magazine special mention has to be made of the untiring efforts put in by Sarvashri D. Santhanam, Instructor, L. Subramaniam, Head Clerk, S. P. Sachidanandam, Senior Clerk and R. Krishnaswamy, Steno, of the Technical Training School.

INSTITUTION OF LOCOMOTIVE ENGINEERS' AWARD TO SHRI SWARUP

(Readers will be pleased to hear that the article "Design and Manufacture of Light-Weight Coaches" which appeared in the April and May 1958 issues of "Railcoach" and which had earlier been presented at the Institution of Locomotive Engineers' Meeting at Bombay, has been awarded a prize by the Institution of Locomotive Engineers, London. Reproduced below is the letter from the Secretary of the Institution.

We join our readers in offering our respectful congratulations to Shri Swarup—Ed.).

The Institution of Locomotive Engineers
28, VICTORIA STREET, LONDON, S.W.-1
22nd August 1958

MR. KRISHNA SWARUP, M.B.E.,
Integral Coach Factory, Perambur, Madrs-23 India.

DEAR MR. SWARUP,

I have pleasure in writing to inform you that the Council have awarded to you one of the Stewart-Dyer Awards for the Session 1957/58 (value £10.0.0) for your Paper entitled "Design and Manufacture of Lightweight Coaches" presented to the Indian Centre in Bombay.

The Awards will be announced and presented at the First General Meeting of the 1958/59 Session in London on 17th September next, and I will arrange for the cheque to be posted to you by Air Mail after that date.

Yours sincerely,
(Sd.)
Secretary.

Monthly Outturn

	Target figures		Actual figures	
	K.D. coaches	Indigenous coaches	K.D. coaches	Indigenous coaches
September, 1958	5	22	4	29
Cumulative total for the first 6 months of the year 1958-1959	30	112	36	143

What's news...and why

Steps to Raise Productivity in Railway Workshops

Scientific incentive schemes to raise productivity are to be introduced in most of the Indian Railway Workshops by the end of the Second Plan period, and for this purpose, production control organisations are being set up in various railways, with a production directorate in the Railway Board's Office at New Delhi to direct and co-ordinate.

The Railway General Managers' Conference with the Railway Board which concluded its two-day session in New Delhi on the 26th August 1958, undertook a review of the Railway Second Five-Year Plan, and it is estimated that the railways would be called upon to carry about 168 million tons of goods traffic by 1960-61. It was disclosed at the meeting that most of the important or urgent works for creating additional line capacity and workshop facilities had already been included in the works programmes upto the year 1958-59 and there would be very few such works left for inclusion in the works programme for the remaining two years of the Second Plan. The position with regard to the supply of materials was gradually easing. The General Managers were requested to bear constantly in mind the need for conserving foreign exchange.

The Railway Minister emphasised the need for giving adequate training to young railway officers on a variety of field jobs, and in this connection, referred to the desirability of transfers from time to time to different types of work. He said that the experience that an officer has on the actual work in districts and sub-divisions would be given due credit at the time of deciding his promotion.

During a discussion on the problem of staff relations on the railways, the point was made that meetings of the permanent negotiating machinery at the district and divisional level should be held more frequently and it should be impressed on all concerned that they should work the machinery in a spirit of understanding. Other points made were, the need for greater personal contact between officers and their staff, prompt disposal of individual grievances, judicious use of the powers of punishment and appeal and the enforcement of strict discipline at all levels. The numerous

What's news...and why

son Tickets for dents

staff welfare measures adopted by the Railway Administrations were mentioned at the conference, and it was suggested that Staff Councils should be revitalised, and more of them should be set up.

The ban against the issue of concession season tickets on suburban railways to male students over twenty-five years of age, is to be lifted in the case of students of engineering and medical colleges.

An announcement to this effect was made by the Union Railway Minister Shri Jagjivan Ram, at a meeting of the National Railway Users' Consultative Council held at New Delhi on September 20, 1958.

Students seeking the concession will, however, be required to produce a certificate from the heads of their institutions.

The ban which was imposed some time ago to prevent misuse of the concession by ineligible persons, will continue in the case of other male students over 25 years of age.

The Ministry of Railways, Government of India, have decided to extend the benefit of concessional milage coupons now being issued to Press Correspondents accredited to them at New Delhi, to Press Correspondents accredited to the State Governments also at their Headquarters with effect from October 1, 1958.

The concession will be available, subject to the production of certificates from the Director of Public Relations of the States concerned and also other regulations in force.

Intervening in the debate on the Railway Freight structure in the Lok Sabha on September 3, 1958 the Minister of Railways, said that Government had taken various factors into consideration such as the overall economy of the country, capacity of industries and consumers to pay additional freights, and arrived at a decision on the recommendations of the Railway Freight Structure Enquiry Committee.

While taking the decisions, he added, Government had also taken good care to see that commodities used in the

lway Concessions 'ressmen

lway Freight Structure

What's news...and why

daily life of the people were not affected by the revision of freight rates. In fact, in respect of some essential commodities, Government would incur a loss by way of freight.

The Railway Minister said that if it was merely a question of the railways earning to meet their expenses, probably there was no case for increasing the freight rates. But the railways apart from balancing their budget, had also to make their contribution of Rs. 375 crores and probably something more towards their own development in the Second Plan period. Therefore, the railways required additional money and hence the increase in the freight rates of some commodities.

The Railway Minister said that after taking various factors into consideration, Government felt that at the present stage it would not be desirable to increase the rates to the extent suggested by the Committee. Therefore, Government modified the recommendations of the Committee. Government's decision had been welcomed in the country. The Railway Ministry would take all steps to see that the country's exports were stepped up for earning more foreign exchange. He said that it was obvious that the Railways could not have a separate rate for that purpose. All that could be done was to give certain concessions in freight rates for certain commodities from certain areas to ports. The most convenient method of giving such concessions was to adopt what he called station-to-station rate.

The Commerce and Industry Ministry and his Ministry were examining the matter and if it was felt that certain commodities required concessional rates of freight, the Railways would be too glad to give those concessions.

The advertisement displays a variety of machine tools in circular frames. At the top left is a **Pneumatic Forging Hammer**. To its right is a **Hydraulic Cold Saw**. Further right is a **Hydraulic Surface Grinder**. Below the hammer is a **Centralised Control Radial Drill**. In the center, a large dark banner reads **HIGH GRADE U.S.S.R. machine tools**. To the left of the banner is a **Plain and Universal Millers**. Below that is a **Horizontal Boring Mill**. To the right of the banner is a **Vertical Boring Mill**. At the bottom right is a **Double Housing Planer**.

OFFERED BY
V/O "STANKOIMPORT"
MOSCOW, U.S.S.R.

Sole Distributors in India
POWER TOOLS & APPLIANCES CO.
2, DALHOUSIE SQUARE EAST, CALCUTTA-1
Branches at: BOMBAY ★ MADRAS ★ DELHI

"THE ENGINEER AS A CITIZEN"

BY

SHRI R. VANCHINATHAN, C.E.E.,
(Northern Railway)

[This article is the gist of an address delivered by the author to the Engineering students of the Delhi Polytechnic Institute]

Let me now thank all concerned for arranging this meet, which has given me an opportunity to tell you—(Engineers in the Making)—some of my thoughts as from an Engineer on the field.

Respect the Engineering profession

At the outset let me say this that I hold the highest respect for this profession of Engineering. It does not matter what kind of Engineering it is—Civil or Mechanical or Electrical or Posts & Telegraphs or Radio or Chemical or Textile or Automobile or what not. For, it all represents "work" in some planned, organised and efficient way, with the object of continuously bettering our standard of life. That is really the function of an Engineer "to himself work, to make others work and to exploit Nature to our common benefit in an organised and efficient manner and produce the varied essential needs of the community." An Engineer is not a talker; he is a worker and if he talks occasionally he does so with the specific object of doing some real work. That is why I hold the Engineer in the highest esteem and I am glad I am seeing before me young Engineers in the making, who in the very near future will have to shoulder the full responsibilities of doing useful and constructive work for our country.

Work for better standards

One may ask, why all this emphasis on "work." Why should we work at all? Why not talk out our life as they do an adjournment motion in the Assembly? Well, I do not think you really want an answer from me to this



question. You know the sufferings of the common masses in our country and you also know the appalling poverty and the very low standard of living of the masses in almost all the countries in Asia—the land of the East. I am referring particularly to the standard of physical living conditions of the people in the East as compared to conditions in the West, say, England or America. I am not referring to mental happiness here. I will refer to it later. We are all human beings, and we want to lead a healthy happy life. To lead a healthy life, the human body needs certain basic requirements, such as good Air to breathe (that means clean sanitary conditions), clean and wholesome food and water to eat, drink and to bathe, clean clothing and housing to protect from weather. Besides we need medical help to combat diseases and, of course, good education

when young, so that when we grow, we possess a healthy body and an understanding mind and do not quarrel and hurt each other. All these requirements cannot be secured without "working." So that is your main fundamental objective to create conditions for comfortable living for all of us by organised effort and work.

Centralisation or decentralisation

Now there are different ways of doing a work. That again depends upon your particular objective, namely, the kind of final material that you want, the quantity and its quality. Supposing you want only a glass of water to drink three times a day. That is a simple matter. You will go to a river or dig a small well and take your water from it. Suppose, on the other hand, you want to supply a town with a population of, say 1 lac of people, with water. Now this work is a big problem. You will have to find a suitable source of supply of water, then purify it, pump it into an overhead tank or tanks and distribute it through pipe lines to each house. To achieve this object, you will have to utilise Electric or other form of power for pumping, for which you may have to make nature work for you. Alternatively, you may sink a well in each house and each house will then be self-contained for its own water supply. That kind of work could be manually handled. It is the function of the Engineer to study each problem and decide which is the most economical and practicable way of achieving our object. I have given you only one small example, but there are thousands of such problems confronting us. If we Engineers do not study each problem in its true perspective and do not take the correct decision, we will have to unnecessarily face avoidable difficulties.

A story

I would like to illustrate this by a small story, which is purely of indigenous origin. A party of about 50 pilgrims was taking a trip

to a distant temple, where each one was required to offer to the Deity a coconut. The party purchased 50 coconuts, put them in a bag and then decided that each one of them should carry the bag over a short distance in relay. It was soon discovered that one person by himself could not easily carry the load of the bag and he was struggling. However, in view of the decision already taken this method was going on for sometime. Half way on the road the party met a Sadhu, who noticed that one man was struggling with a load on his head, whereas the rest of the crowd was walking free, singing and merry-making. He enquired of the reason and then advised them that each man could take one coconut in his hand and then the whole lot could walk comfortably. This is just an instance to show how centralisation is not always the best system of work to adopt and in your future Engineering problems you will often have to decide the extent of centralisation or decentralisation necessary in each case. As this seems to me to be a very important matter I thought I might mention this and bring it to your notice with some emphasis.

Manual labour and mechanisation—Simple living

Our country is vast in area and mostly agricultural. Our past economy has been based mainly on "manual labour." We were and are still living mostly in villages. Towns with large populations were rare. Nowadays conditions are tending to change. Copying the Western Industrialised Nations, we too are crowding into towns. Personally, I see in this trend a danger sign to the prosperity of our land. Basically we are accustomed to live in small groups in villages and frankly we do not know how to live together in large numbers in cities. On the other hand, there are many advantages in simple living in villages, particularly from the health point of view. We can still have large key industries spread over the country—each manned by say 5000

or 10,000 workers, and perhaps more small or cottage industries, each run by say 100 or 500 workers maximum. With modern appliances, such as, Electricity, Telephones and Telegraphs and Railways, there should be no difficulty in transmitting power or sending messages or transporting men and materials as needed from place to place and there is no need to crowd into towns. It is for you, future Engineers, to think over these problems and practically execute the most suitable and economical schemes for the development of the country and provide useful employment to all of our countrymen. So much about physical happiness.

Mental happiness—Art and Religion

Now coming to mental happiness, if you Engineers ensure a comfortable living for the people, then there will be leisure for developing the higher faculties of the human being. There is Art, Music, Dance, Drama, Literature and so on and above all a thirst for the spiritual uplift of the individual to become one with the Creator. Indeed, this may be said to be the final objective of all human beings. At any rate, in our land this has always been so. We know that real mental happiness lies only in the field of spiritualism. However, the prerequisite necessary for this higher development of the human soul is a healthy body, which can alone produce a healthy mind. Engineers, who are normally reputed to be of the materialistic type, being engaged in the production and development of materialistic wealth and therefore looked down upon by certain spiritualistic group, are really the fore-runners for establishing the ground for producing real philosophers, artists, musicians etc. It is a general belief that the greatest of philosophers, artists, musicians etc. are born of poor and suffering families and therefore poverty and suffering is always associated with philosophy, art, literature etc.; but I would like to emphasise that it need not necessarily be so. There have been "*philosopher kings*" as well as '*poor*'

philosophers and religious leaders. To name a few—Sri Ram, Buddha, Asoka and so on, on the one hand and Sankaracharya, Ramakrishna Paramahansa, Thyagaraya and so on, on the other. Perhaps with better conditions of living and more leisure, greater number of people will go in for the study of Art, Music, Literature, Philosophy, etc.; and possibly there might be a greater number of Artists, Musicians, Philosophers, etc., in our country. Actually in India of the past Rishis and Philosophers led a simple life, but received all the protection and respect from the Rulers of the land and they were kept comfortable. They did not, however, care for unnecessary and undesirable material wants. Perhaps in India of to-day also, our materialistic economy could be planned on the same lines, keeping materialistic wants to essential items only and the Engineers will have to play a big part in moulding the destiny of the country by judiciously selecting what is really needed materially and what is not.

Perhaps I may in conclusion say a few words of friendly advice to young Engineers :—

Respect your profession

The first and foremost is to develop a respect for your profession. Remember, you will soon belong to a group of honest and efficient engineers of the country, whatever may be your future position in life—the ultimate objective being to ensure a respectable and comfortable living for all in the country. You must, therefore, now put your heart and soul into your learning work and make the best use of your time while here.

Respect your teachers

Secondly, you must maintain a respect for your teachers. This is very essential. With such a mentality you will actually learn, perhaps unconsciously, a lot more than what the teachers

themselves intended to teach you. Often it is not what you 'eat' that matters. It is what you 'digest' out of what you have eaten that matters. Respect for your teachers will improve your 'digestive' power.

Develop friendly fellow feeling

Thirdly, develop a healthy and friendly fellow feeling towards all your associates in this Institution. Later, when you meet in life, you may be in different positions and the early days of friendship will go a long way to produce healthy co-operation in later life. Remember for an Engineer, to get through his schemes, co-operation with others in the field is mightily essential.

Do your duty anywhere and everywhere

Do not worry, if later in life you do not get the position or rank you expect to get. The number of high grade jobs is very much less than that of the low grade ones. By all means strive to better your position, but whatever comes your way, do the job thoroughly, efficiently and honestly and have respect for the job you do. This will give you the greatest of mental happiness in life. Similarly, respect any kind of work honestly and efficiently done by those under you. There is no job, which is inferior or superior. All jobs, *bonafide* ones and well done

are equal in value in the ultimate analysis of things. This does not however mean that all are equal and there should be no order in the Society. Particularly in the Engineering field, orders will be issued from those above you and you will have to execute them. Similarly, you will have to issue orders to those under you and see that such orders are carried out.

Be honest

Above all maintain a high degree of honesty in all your dealings. Engineers are not trusted nowadays; their work is actually checked and passed at every stage by non-technical people with the result the work suffers. I wish the day will come when Engineers will be trusted to execute their jobs freely and smoothly.

A Few Personal Hints

A few more personal hints before conclusion :—

- (a) Do everything possible yourself. Do not depend upon others. Self-help is the best help. Try to "give" more than "receive."
- (b) Be specific and clear and precise. Where a post card would do a job, do not write a letter or send a telegram.
- (c) Try as far as possible to use local materials and labour in your engineering jobs.

AGREEMENT FOR WORLD BANK LOAN FOR EXPANSION OF RAILWAYS

The World Bank has approved of a loan equivalent to 85 million dollars to India to help her meet the foreign exchange costs of a programme to improve and expand the Indian Railways which is an important part of India's Second Five-Year Plan.

The First Pennsylvania Banking and Trust Company of Philadelphia will participate in the loan without the World Bank's guarantee to the extent of 500,000 dollars representing parts of the first five maturities which fall due between January 15, 1963 and January 15, 1965.

The Bank's loan will help to pay a part of the cost of rolling stock, locomotive and other equipment during 1958 and the first quarter 1959.

The improvement and expansion of railways have progressed satisfactorily in the Second Five-Year Plan and shortage of rail transport is now less acute than it was two years ago. Adjustments in the programme are continually made to meet the needs of traffic as they develop. Since July 1957, when the Bank lent India a sum of 90 million dollars for the railways, the programme has been revised to provide for increase in freight carrying capacity. During the Plan period it is now intended to increase the freight capacity of railways from 114 million tons annually to 168 million tons instead of 162 million tons as originally planned. This will require the purchase of 11,000 additional freight cars over the 107,000 originally intended. Plans to meet the 15 per cent increase in passenger traffic during the Plan period remain unchanged.

The approved expenditures of the railway programme under the Second Five-Year Plan were to be Rs. 11,250 millions (2,366 million dollars) of which Rs. 4,250 million (893 million

dollars) would be required in foreign currencies for the purchase of essential goods, material and equipment which are either not produced in India or of which the domestic supply is insufficient.

The loan was approved on September 12, 1958, by the Bank's Executive Directors and the loan documents were signed at Washington on September 16, 1958, by Mr. Hariswar Dayal, Charge d'Affaires of the Embassy of India, on behalf of the Government of India and by Mr. Eugene Black, President of the Bank.

The Charge d'Affaires recorded a message for the Voice of America on the conclusion of the agreement in which he said that he was happy once again to sign a loan agreement with the World Bank on behalf of the Government of India. This was the second loan by the World Bank for the Indian Railways. The first for 90 million dollars made in 1957 had been almost wholly drawn. This showed that the railways are well ahead with their plan and with its execution.

The new loan, he said, would assist in the purchase from several countries of material and equipment ranging from locomotives and rolling stock to components of all kind. The improvement of transportation systems in the country was an important part of the Second Plan which needed fast movement of the products of India's developing industries. The World Bank's participation in the Second Plan is now of the order of half a billion dollars and Mr. Dayal said that this indication of the Bank's confidence in our determination and capacity to fulfil the Plan was gratifying. Referring to the participation of private banks in this loan, he welcomed such interest on the part of private investors.

In closing, Mr. Dayal expressed appreciation of the part played by the President of the World Bank, Mr. Eugene Black, not only in negotiating particular loan projects but in taking the initiative in working up overall interest on the whole question of India's economy.

The Indian loan is part of a World Bank contribution to India's foreign exchange needs in the next seven months which is expected to total 100 million dollars.

The remainder of the 100 million dollars will come from disbursements on an already-announced loan to India for electric power development.

The World Bank's contribution is part of an overall 350 million dollar aid plan for India during the remainder of the current Indian fiscal year which was agreed upon by a meeting of India's leading creditors held here late in August 1958 under the Bank's auspices.

The loan is for a 20-year term and is at 5½ per cent interest. Amortisation will begin in January 1963.

The Bank's announcement said: "Improvement and expansion of the railways has progressed satisfactorily in the Second Five-Year Plan and the shortage of rail transport is now less acute than it was two years ago. Adjustments in the programme are continually

made to meet the needs of traffic as they develop.

"Since July 1957, when the Bank lent India the equivalent of 90 million dollars for the railways, the programme has been revised to provide for an increase in freight-carrying capacity. During the Plan period, it is now intended to increase freight capacity of the railways from 114 million tons annually to 168 million tons, instead of the 162 million originally planned. This will require the purchase of 11,000 additional freight cars over the 107,000 originally intended. Plans to meet a 15 per cent increase in passenger traffic during the plan period remain unchanged.

"The approved expenditures on the railway programme under the Second Five-Year Plan were to be 11,250 million rupees (2,363 million dollars equivalent) of which some 4,250 million rupees (893 million dollars equivalent) would be required in foreign currencies for the purchase of essential goods, materials and equipment which are either not produced in India or of which the domestic supply is insufficient.

"The additional increase now planned in freight capacity should be attained without adding substantially to the original estimates of total costs, and with an actual reduction in the foreign exchange costs. This will be achieved by improved operating efficiency and the postponement of certain less essential parts of the railway programme."

MESSAGE OF GREETINGS TO THE WORKERS OF THE I.C.F. ON THE CONCLUSION OF THE THIRD YEAR OF PRODUCTION

We have passed another eventful year and our performance during this year can be considered to be most satisfactory from all standards. I must congratulate you all on this performance and the devoted and loyal service which you have put in.

This year was all the more important for us as most of the Swiss Experts and Engineers had left in the beginning of the year and we had to carry on, on our own, during most part of the year. To increase the outturn from 240, which was the revised target, to 308 is most creditable. Besides this, we have completed a Prototype of a new TLR in light-weight construction, and are now recognised as experts on welding.

We have another year in front of us and we will be required to work even harder in establishing the maximum outturn at 400 coaches a year. With your devoted and faithful service, I am sure we will pass this landmark also. Let us not forget that by our hard work and efficiency, we will not only raise the prestige of India in the world but also of industries in the Public sector and particularly of the State of Madras in which we are located.

The Furnishing Side has also been playing its part in the same satisfactory manner as the Shell Side. There we have achieved an outturn of 14 coaches a month, and in the next 5 to 6 months we have to develop it to 20 coaches a month. I am sure that we will be able to achieve it with the devotion to duty that you have shown.

The strength of staff has increased from 3,750 on the 2nd of October 1957 to 6,000 on the 2nd of October 1958. The bigger the I.C.F. Family grows the more urgent the necessity of keeping good human relationship and looking after each member of the family. We have also to develop a proper spirit of 'give and take' and then only can a happy family flourish. I am glad to see from the proceedings of the Staff Council meetings that this spirit exists in abundance in the I.C.F. May Providence give us good counsel and enable us to maintain this happy relationship.

In concluding, I would like to extend my heartfelt greetings to all members of the I.C.F. Family and wish them all the best.

MADRAS-23

3rd Oct. 1958

K. SWARUP

Chief Administrative Officer

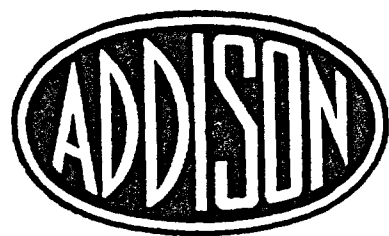


ENGINEERS' CUTTING TOOLS

Milling cutters, Reamers & Involute Gear Cutters—made according to B.S.S., of Metric or Customers' specifications.

HEAVY DUTY FERROUS & NON-FERROUS CASTINGS

For the Automobile & Machine Tool Industries—specialists in High Tensile, Dense, Close Grain and Pressure Tight Castings.



STEEL FURNITURE

For the Home and the Office.

SPRAYERS & DUSTERS

For Plant Protection & Public Health.

LIGHT ENGINEERING PRODUCTS

and Material handling equipment.



DISTRIBUTORS FOR:

AMCO BATTERIES



ADDISON & CO (Private) LTD

158, MOUNT ROAD MADRAS-2

Branch: 24, ST. MARK'S ROAD, BANGALORE

Depot at: COIMBATORE

ROLE OF SUPERVISORS IN INDUSTRY

BY

C. G. DEVAYA,

Senior Mechanical Engineer—Administration

The role of a Supervisor can best be explained by examining the following three aspects :—

- (i) The Supervisor's place in the Organization.
- (ii) His qualifications.
- (iii) His responsibility.

I. Supervisor's place in Organization

Organization may be defined as the division of work to be done into defined tasks and assignment of these tasks to individuals who are qualified by training and natural characteristics for their efficient accomplishments. Organization is to the Industry what the nervous system is to the human body. Its purpose is to send instructions (impulses) to the operating members and to receive and transmit to top management (the brain) information which will enable it to function intelligently.

There is a wide range of opinion regarding the relative importance of Organization. One line of thought is that almost any type of Organization will work so long as the right people are operating it. Others lay great stress on Organization charts, procedures and techniques and adopt the human factor to this frame-work. In practice a compromise between these two views works out to be the best plan, giving due consideration to the human side of Organization using certain proved charts and guides, procedures and techniques. Good industrial management concerns itself with the development of personnel as well as the technical direction of manufacturing operations. Proper selection of Supervisors who make up the Organization, their training and proper assignment



form the very basis of efficient Organization. There are several types of organizations which we shall not go into details but it would be necessary to stress that in all types of organizations the Supervisors play a very important role. They occupy positions at the key points of the organization not only for the controlling of efficiency in technical operations but as important, if not more, for the creation of good morale in the organization. It is a wellknown fact that morale can make or break an organization.

The position of Supervisors at the critical level in the structure of an Industrial organization calls for a precise analysis of the Supervisor's jobs and a search for the criteria of Supervisory success. Through the Supervisor all decisions from above have their impact on the number of workers doing their daily tasks and this explains his key position in a Factory.

His personal contributions play an important part in determining the practical outcome of policies, plans and attitudes, good or bad, of higher management.

In the days gone by, the job of the Supervisors was interpreted as one wherein he was required to harass the workers and get the work out of them by some means or other, but conditions have since changed completely. Adequate technical training and education is imparted to both workers and Supervisors and the approach, the Supervisor is required to take in the technique of executing supervision, is more scientific and calls for following precise methods of technical control and establishing pleasant relations with the workers under him, with his colleagues and with the superiors above him. For a long time industrial thought was mostly concentrated only on technical developments and on the problems from the view points of the Management. The human aspect was inclined to be neglected but in the modern trend of Industrial thinking, the human relations and the great influence that the Supervisors can bring about in creating an atmosphere of goodwill among workers is also given great importance.

There are various levels of Supervisors in the structure of control of a Production Unit—

- (1) Supervisor in charge of a complete Shop having considerable authority and responsibility ; (F.Os.)
- (2) Supervisor responsible to (1) above with work of a wholly supervisory nature with some general planning and organising ; (A.F.Os.)
- (3) Supervisor with an entirely supervisory responsibility with planning and organising in their limited spheres. (Chargemen)
- (4) Working Supervisor—actually a worker but carrying some specific supervisory responsibilities. (Mistries)

Whereas the degrees of responsibility and the authority at each of these levels are varied, it is

clear that each Supervisor occupies a very important place in any organization.

II. Qualifications

Obviously, in order that one may be a successful supervisor, one should essentially develop the quality of leadership, which in turn calls for the development of the following qualities :

- (1) Sound Practical knowledge with sufficient fundamental theoretical background.
- (2) Character and Integrity.
- (3) Co-operation.
- (4) Fairness and loyalty.
- (5) Forcefulness.
- (6) Sound health.

A good background, no doubt, is a great asset in developing the above qualities, but by hard work they could well be developed by any individual who takes on himself the desire to equip himself for carrying out the duties and responsibilities of a Supervisor.

Technical capacity should necessarily be developed to the utmost by the aspirants in an industry like ours. In a strictly technical field lack of technical knowledge would certainly be the most serious handicap. In order to have a thorough grasp of one's technical work the theoretical fundamentals should be well understood. Modern trends and current practices in allied industries should always be kept in touch with by all. This calls for considerable private study at home or in libraries and possibly visits to other industries whenever opportunities arise.

The capacity to produce good human relations is the other most important factor in leadership and supervision and this should influence the Supervisor's attitude not only towards his workers but towards his colleagues and superiors. To become a successful Supervisor, it is necessary that your workers, colleagues and superiors like you. You will have to go out of your way to help them and this you will

find is one of the easiest ways of being liked. You should command respect without losing their liking. Conciliatory weakness in action should not be resorted to and a balance between respect and liking should be developed. There is no such thing as a 'born-leader' and by a proper understanding of your work, responsibilities and the people working with you, you can develop the quality of leadership.

Individual workers have their personal problems which must receive the sympathetic consideration of the Supervisor. It should be remembered that the Supervisor is responsible for the overall efficiency of the work of a considerable number of workers of widely different age groups, intelligence, operative ability and aptitude to their work. Among his workers there are many who have a sense of co-operation, loyalty and citizenship and many who only give a very little output compared to the average. The Supervisor must get these varied people to work as a team, get the output which is expected of them, maintain discipline amongst them and train new-comers.

In his position as a Supervisor, the attitude which the men develop towards the management as a whole will be governed by the attitude they develop to the Supervisor himself. Even when the supervisor is sufficiently loyal and conscientious he may be exposed to the temptation of passing on certain instructions of the management in a personal manner which with a turn of a phrase or an intonation of voice destroys their value by implying that he dissociates himself from the contents and the Supervisor should therefore carefully guard himself regarding the manner in which he interprets the various directives.

At the point of action, i.e., to the workers in his Section, the Supervisor must interpret rules, regulations and systems which may be either very detailed or sometimes difficult to apply in actual practice. Technically he must command the respect of his men and be able

to personally implement in practice processes and procedures and make intelligent use of the machinery and plant under his control. He should be able to operate the machines himself and be capable of discussing and explaining to the workers the reasons for the various methods, practices and policies.

Group-morale of the workers is one of the aspects, the development of which is very much in your hands as a Supervisor. The supervisor that makes one group of workers resent will make any other group also resent similarly. The essential elements of leadership are always the same in any industry in any part of the country or anywhere in the world. If your group of workers has a well built-up morale there is nothing that you cannot accomplish.

There are three important factors to be remembered in dealing with your workers—

- (1) The workers should be interested in their work ;
- (2) The workers should be satisfied with their general working conditions.
- (3) At all times you should display a good quality of leadership.

In order to get the workers to be interested in the work, you should commend them for good work. Whenever he is in difficulty he should be assisted—this may be in the shape of provision with good tools, clarifications, issue of specific instructions, etc.

It is most vital that you do not display favouritism—not even give an impression of being given to favouritism. You have to closely check your speech and action in order to provide a satisfied working atmosphere for the worker. Rash and impulsive promises which may not be within your control to fulfil should be guarded against as this is the easiest way of making the workers lose confidence in you.

Leadership always calls for very special check on your own actions. It is possible that due to some circumstances you have

received an unmerited rebuke from your superiors. Do not discuss this with your workers or even with your colleagues, for it only creates conditions of dissatisfaction around from which you may find it difficult to extricate yourselves.

As a Supervisor, it is necessary for you to develop a spirit of co-operation. You may know your job well and may have great technical capacity. But, if you are bull-headed and unable to give or receive co-operation your success as a Supervisor will be greatly limited. Co-operation runs in two distinctive directions in any organization, one is the Vertical Co-operation and the other is the Horizontal Co-operation. Vertical co-operation is the co-operation between you and those working under you or those working above you. The horizontal co-operation is the co-operation between the Supervisors of functional departments at your own level, some of your own department and some of other departments in the organization. The horizontal one is more difficult to achieve and is often disregarded. If there is no horizontal co-operation, there is a hold-up of work and inevitably produces the lack of good supervision. Co-operation between brother-supervisors is the lubricant that runs the work smoothly. At all times try to win co-operation from all levels. Arguments in a friendly atmosphere do not destroy co-operation carried out in the correct spirit, this only elicits clarification. The index of efficiency of any organisation is governed by the degree of co-operation that exists horizontally and vertically within its framework.

There is rarely an employee who is not deserving of a reprimand sometime or other. The way the reprimand is communicated is important. A supervisor who fails to reprimand when absolutely essential, or reprimands at wrong times or excessively or inadequately lays himself on to lose the grip on supervision. It is necessary to make sure that a reprimand is really deserved before making it and this

should be a point for careful thought on the part of each Supervisor.

Development of one's own personal character and integrity simplifies your task of enforcing discipline among your workers as you would naturally command their respect by virtue of your own conduct.

Sound health is a very essential requisite of a Supervisor as on this depends the extent to which efficiency can be maintained in supervision—besides this is one's duty to his own family and the Supervisor would be well advised to take necessary steps to ensure this aspect.

In order to develop the correct disposition it is necessary for a Supervisor to have healthy social habits and active interests. If they are wide and deep so much the better. It may be an interest for a game of chess, foot-ball, badminton or any other hobby. What matters is not only what you are interested in, but the standards which are set by you for yourselves. It should be understood that the management are continually on the look-out for good Supervisors and it is vital for you to go out of your way to acquire the various interests that go to make a good Supervisor.

III. Responsibility

Having dealt with the qualities that are required to be displayed by a Supervisor, we shall now switch over to the responsibility of the Supervisor. Actually the responsibility is to be defined in all cases with special reference to the specific task allotted to the Supervisor, but for the purposes of this talk this aspect can only be examined in a general way.

Responsibility increases with authority. While as a worker you are responsible only for your individual output, as a Supervisor you are responsible for the output of others and this calls for a disposition entirely different.

Normally, as a Supervisor of a particular section, you are responsible for :

- (1) Volume of production ;
- (2) Quality and standard of the product ;

- (3) Maintaining general discipline ;
- (4) Allocation of work and overtime ;
- (5) Building up the morale of the working group ;
- (6) Meeting delivery and completion dates ;
- (7) Training of operators ;
- (8) Planning in your own sphere ;
- (9) Ensuring that the correct methods of work are followed ;
- (10) Certain amount of paper work in connection with production control ;
- (11) Maintenance of Stores and materials ;
- (12) Maintenance of machinery and tools.

In accepting these responsibilities you will find that there are several factors in the nature of your job which are within your control and several beyond your control. Several problems have to be decided by mutual discussions with your colleagues. Others are controlled by some key personality at a remote point, based on policies and methods of which you should be fully conversant with, as this governs your efficiency and the stresses and strains to which you are subjected to. So, it would be your responsibility to be conversant with all the procedure orders and policies—technical and personnel—which are laid down by the Organization. You are held personally responsible for the Organization of your group of men—for the use and condition of the machines and Plant in your Section for the errors and omissions in the work or behaviour of the workers under your control. You will be blamed if things go wrong and given credit when things go right. Discipline is to be maintained at all costs. You are required to report breaches of discipline, and promote the conditions under which they are unlikely to occur.

It is a wise thing for each of you to critically analyse your supervisory job individually and find out as to what you are specifically responsible for. Then, you will be in a better position to discharge your responsibilities. Other-

wise, you will find yourselves drifting without a proper grip of the situation. It will assist you to make a specific break-down of each item of your responsibility. For example a break-down of your responsibility for production would be summed up as under :—

- (i) Care and operation of machinery ;
- (ii) Care and operation of tools ;
- (iii) Adoption of the most economical methods of manufacture.
- (iv) Inspection of finished and unfinished work ;
- (v) Checking for deviation from standard practices.
- (vi) Learn new methods (keepin guptodate with current practices) ;
- (vii) Keeping raw materials on hand ;
- (viii) Routing of work through shops ;
- (ix) Handling of raw materials and finished product.

Set procedures are generally laid down to cover the above items of your work which should be adhered to but there is plenty of scope for planning in your own sphere to increase efficiency. Each aspect could be carefully analysed and you can chalk out your own line of action to achieve your ends.

In dealing with young workers, you, as Supervisor, are often called upon to function as a Teacher. In assigning any new work to a worker, the Supervisor has to consider the following :

- (1) Preparation of the work ;
- (2) Assigning the work ;
- (3) Observation ;
- (4) Testing the workers' capacity.

In preparing for the work it may be necessary for you to have a word or two with the worker in respect of the work to know how receptive he is to this new work. In other words, you try and judge his capacity. Next you will do

well to plan as to how you would do the work yourself and formulate your instructions to the worker accordingly. In assigning the work to him you could tell him what the work is and show him how exactly the work is to be done. Observe his actual performance and correct his mistakes, if any. In testing him you are to ascertain whether he can work independently without your help. He may be in difficulties due to several factors entirely outside his control. Do not just leave him at sea with his problems, but try to help him. All the workers coming under you should receive a proper distribution of your attention. Obviously, certain more important jobs should receive greater emphasis. No one else except you can lay down priorities in this respect.

In conclusion you would do well to remember as a Supervisor you are directly responsible for the best utilisation of the 3 m's, men, machines and materials entrusted to you. As already mentioned, maximum efficiency is obtained from men by suitable instruction and training in a properly developed atmosphere of good human relations. One of the usual leakages in manpower capacity on the Shop floor is by way of idle time. There are several reasons why idle time is booked in Shops against men and machinery. The reasons should be analysed carefully and action taken to eliminate such idle-time. The safety of workers is a very important aspect and very much your concern. There are certain glaringly avoidable cases which cause accidents, which may not be apparent to the worker, but can be easily detected by you provided you apply yourself to the problem. The machines are expensive assets. Most of them are imported and in obtaining them considerable foreign exchange has been incurred. Machines have to be looked after as though they are your own personal property. Several break-downs occur due to lack of lubrication, carelessness in manipulation and poor maintenance which could have been easily avoided. A well looked after machine can be

easily spotted by its appearance. Walking round the shops one perceives that machines in certain Sections are clean presenting a good appearance. Sometimes only particular machines and not all in a Section answer to this description. It is due to the fact that only certain Supervisors and operators are alive to the importance of machinery maintenance and others are indifferent. This aspect should receive the constant attention of all Supervisors. Machinery efficiency suffers if improper tooling is used. You must educate yourself regarding the tools. It is a complex subject and needs considerable study.

Economic use of materials comes out of production planning. It should be ensured that there is no wastage of materials. You should ensure that the manufactured part is correct to specifications and drawings. This is one of your most important functions. The safety and quality of the coach which is turned out of this Factory is obviously due to the cumulative efforts of one and all of you. Centralised inspection cannot exercise cent per cent inspection. As a supervisor in a Section you are bound to come across the deviations which often occur in the course of manufacturing operations. It is your duty to screen out the defective parts and bring it to the notice of the authorities competent to decide on the issue.

Material handling greatly influences production economy. You will realise that a tremendous weight of materials is handled daily in the course of the manufacture of the coaches. Raw materials have to be brought in and stacked at the right time and put through the various sequences of operations. Parts are to be transported between load centres and to the storage spots. Inefficient handling increases the cost of production and is virtually a great obstruction to production flow and efficiency. Wasteful methods and unnecessary handling should be eliminated. In your own Section you could make a study of the problem and

chalk out routes for the travel of each set of materials. Earmark the storage areas so that the whole process is systematised. We have adopted the pallet system for transportation and greatest advantage of this system should be derived by careful planning. We are considering the introduction of belts for some of the heavy parts. Smaller belts could be planned for many of the other parts in your own sections without interfering much with the machinery lay out and you could take the initiative in originating ideas for your own sections. A proper plan for the material handling will render your supervision easier and your section will not only present a neat appearance but also have its efficiency boosted up—production will be economical—Economy is one of our principle objectives to be aimed at.

You are in the most advantageous position to contribute in effecting greater economy with new ideas as the jobs are being carried out under your immediate supervision. Originating a new idea gives one a great feeling of satisfaction and confidence in one's own capacity for thinking and so be always on the look out for ways and means of effecting improvements in methods. Besides there is also the suggestion scheme whereby you can cash in on your ideas. The administration is most anxious to receive new ideas and sanction awards as these ideas benefit both the originator and the administration. Judging from the very few suggestions that are being received it is obvious that not all the supervisors and workers have seriously applied themselves in this respect. It is for you to explain the scheme to each of the workers

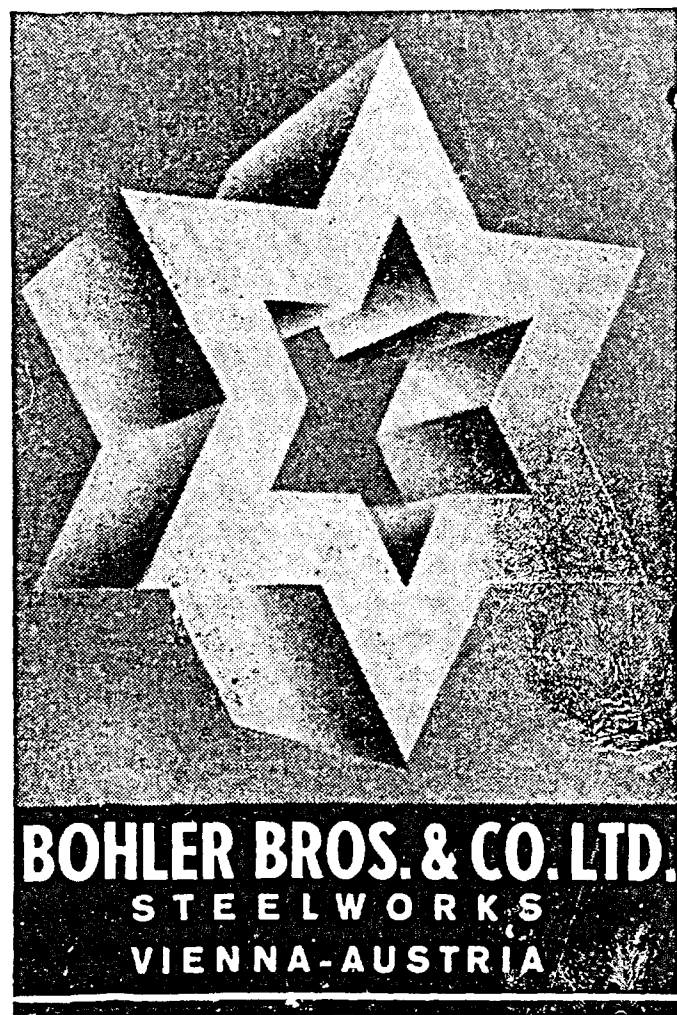
and get them to think. When one is all the time on the look out for new ideas he acquires a more dynamic personality and develops a new outlook altogether and this will do you a lot of good personally. While you are in charge of a section the Section belongs to you—try and run it as though it is your own business concern.

Reviewing all that has been said so far, one would wonder if a supervisor is required to be a super man to achieve all these qualities. There is no doubt that much hard work and diligence is called for but all these qualities are those that are capable of being achieved provided a reasonable effort is forthcoming.

Most of you are young and your experience is neither long nor varied. But you have the opportunity and a whole future lies before you. Obviously you could not have possibly had the adequate experience desirable but in lieu you could develop compensating degrees of ability and character by dint of hard work.

It is for the older of you to befriend and guide the younger and inexperienced. Sometimes there is a tendency for the more experienced to ignore the views and ideas of the younger. This hardly is the right thing, for the task is to be performed by a team and a proper team must be developed for the benefit of all.

Principles of good supervision should be understood by a careful analysis of what is required by you and stuck to throughout the year. It should be remembered that management is always anxious to make a good Supervisor of you provided you display the necessary qualities.



HIGH SPEED STEELS
SPECIAL STEELS
STAINLESS STEELS
MACHINE KNIVES

TOOL STEELS
CONSTRUCTIONAL STEELS
MAGNETS
PNEUMATIC TOOLS

TUNGSTEN CARBIDE TIPS AND TOOLS

Free Technical Advice on the spot by Manufacturers' Experts

ENQUIRIES TO SOLE AGENTS:

THE BOMBAY COMPANY PRIVATE LTD

Post Box No. 109

169 Broadway

MADRAS 1

BOMBAY
P. B. No. 1081

CALCUTTA
P. B. No. 139

NEW DELHI
P. B. No. 591

COCHIN
P. B. No. 10

CAO(R)'S CIRCULAR ON SUGGESTIONS AND INVENTIONS SCHEME

This scheme, which was introduced in this Factory from 12th July, 1956, has undoubtedly become popular amongst many of the employees and there has been a steady increase in the flow of suggestions during the past 8 months.

Everyone of you may have constructive ideas and many may have useful suggestions to make. It is my earnest desire that all grades of staff interest themselves in thinking of improvements in all phases of the activities of this Factory. I, therefore, like to bring to the notice of staff at all levels that any suggestions that they may have for improving methods of work, and any ideas of theirs for improving existing devices, or new devices, and improve safety, and economise and bring down the cost of the coach will be welcomed and will be carefully considered. In this connection I may re-iterate that no suggestion will go uninvestigated and if its practical utility is proved, it will not go unrewarded.

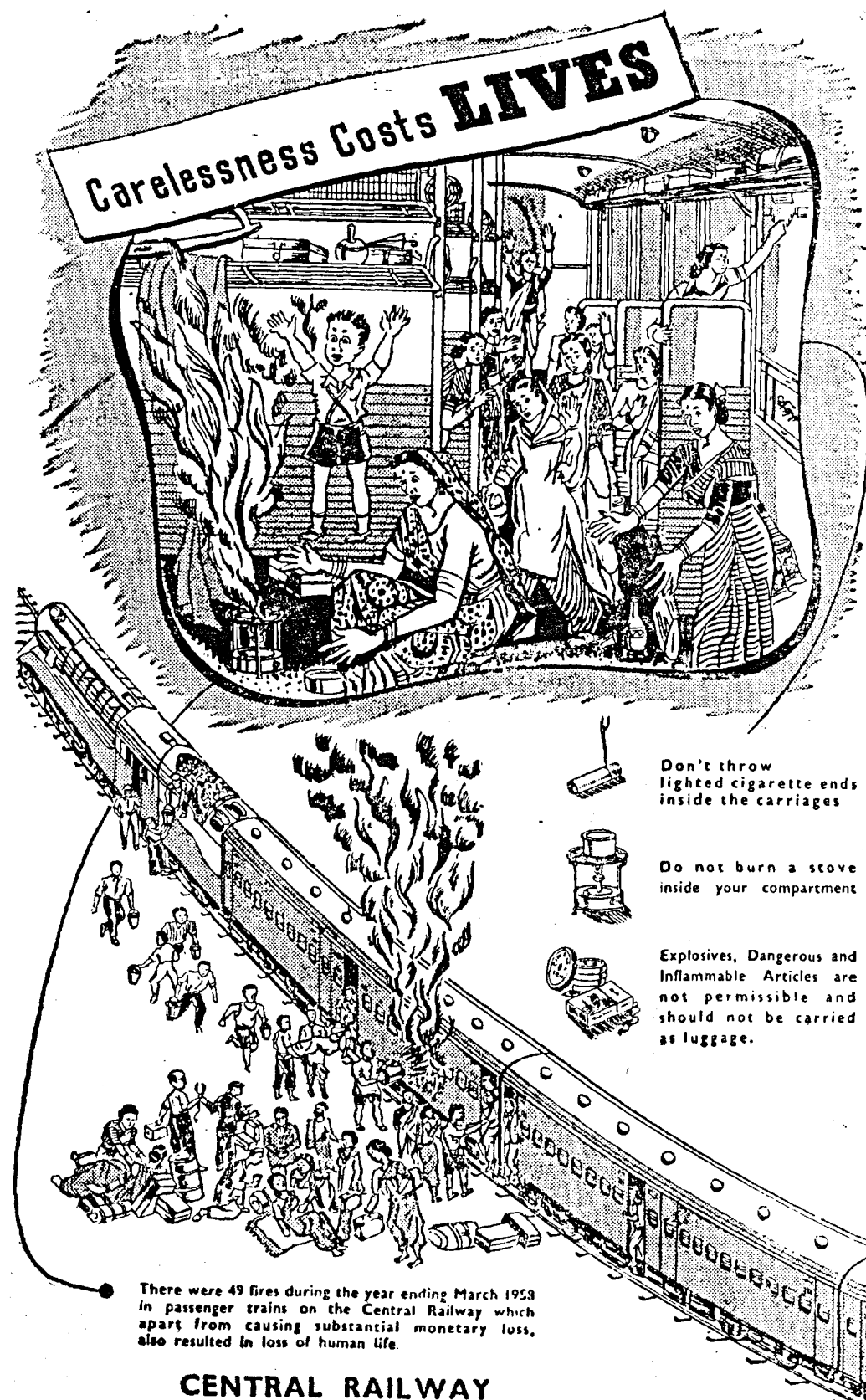
It may be interesting to all of you to note how the Scheme has been working in the past years. The figures are given alongside for your information.

Besides the grant of reward for accepted suggestions, the fact that an employee has made an acceptable suggestion will be recorded in his Service Record and will be given consideration when considering his suitability for promotion to a non-selection or selection post. For particularly valuable suggestions, grant of advance increments or grant of study leave to the suggestor are some of the benefits that might be considered.

In conclusion, I appeal to one and all of you to continue to send your suggestions through suggestion boxes, which have been installed for this purpose all over the Factory. These are painted green and printed suggestion forms are available with the Shop Foremen.

Details of Suggestions received and accepted

Year	No. of suggestions received	No. of suggestions accepted	Approximate annual savings	Value of rewards granted
1954	2	1	Rs. 192	Rs. 10
1955	...	...	...	...
1956	23	1	Rs. 300	Rs. 50
1957	76	3	Rs. 1,082	Rs. 100 Rs. 50 & Rs. 10
1958				
January	23	...	...	...
February	13	2	No financial Savings	Merit Certificate in both cases
March	45	...	...	...
April	22	...	...	...
May	28	5	Rs. 4,260	Rs. 50 in each case
June	20	3	No financial Savings	Rs. 50 Merit Certificate
July	37	...	...	...
August	41	9	Rs. 13,095	Rs. (a) 100 (b) 50 (c) 100 (d) 200 (e) 100 (f) 30 (g) 50



THE SOCIAL RESPONSIBILITIES OF THE INDUSTRIAL ENGINEER

BY

PROF. R. F. BRUCKART,

Indian Institute of Technology, Khavagpur

The approach to people truly differentiates the industrial engineer from other branches of engineering. It is important for the industrial engineer never to forget the human being and his place in the system. This even applies when the human being will not be needed in the system, and the industrial engineer has to solve the problems thus posed.

The Relationship of Industrial Engineering to Engineering :

The definition of engineering offers another reason for the growth of industrial engineering. Engineering may be defined as *the art of controlling the forces and materials of nature, and organizing and directing men, for the benefit of the human race*. The branches of civil engineering, mechanical engineering and chemical engineering provided for the first part of the definition, but the second part was not taken care of adequately. The new branch of industrial engineering was needed.

Various factors are causing a strong shift in the emphasis in industrial engineering. One of these is the accent on the use of "automation." In industrially advanced countries this is causing a shift in where the greatest economies can be found in the plant, but more important it is creating a whole series of new problems. Recently a representative of the Ford Motor Company in a U.S. Congressional Sub-committee Meeting brought out the fact that for every 2 persons displaced by automation, slightly more than one additional skilled maintenance technician is required to support the new machines. It should be pointed out that all others so displaced were

absorbed and that the total number of workers remained constant. Thus, automation brings with it a trend towards *monitors*, or observers rather than operators, and we have some estimate of its impact quantitatively.

The Engineer in Management :

Yet in general, engineers find it difficult to step into managerial or executive positions. Engineers—even industrial engineers—commonly find it difficult to measure the intangibles in business, and therefore underestimate their importance. These matters of emotions, pre-conceived ideas, traditions, customs, prejudices—all pose difficult problems for the engineer to cope with. Many executives will tell you that often problems arise either in human relations or in probing into unknown physical or material problems, when an imaginative approach becomes more valuable than a judicial or analytical one. Guesses and formulas, calculated risks, based on intuition and judgment sometimes must be taken when no chart, slide rule, or formula will help or when the lack of time will not permit an extensive analysis. An executive of the American Brake Shoe Company put it in this fashion:

"There seems to be too little in the training of an engineer to make him realize the world is full of people. Perhaps you would call this the aptitude for humanity. Pure technicians—the laboratory analyst, the aircraft stress-engineer, the highly specialized surgeon—can forget the importance of this. But none of them can become a successful manager until he learns that people make up as much of the world as the elements. Certainly

management in business must understand this. Human nature is fascinating, but it can be extremely tantalizing because it follows no known scientific law nor even a broad principle."

It is entirely feasible to substitute the term industrial engineer for manager in this statement. President Griswold of Yale University has stated :

It is said that the demand for engineers is so urgent that it would be impractical to prolong their apprenticeship with the liberal arts. Yet the most urgent part of this urgent demand is for engineers who can cope with human problems. Only these can save out technology from becoming a headless, heartless, and eventually helpless monster.

These ideas might be summarized in this manner : engineers as a group are accustomed to being guided in their decisions by facts, and rules based on facts. They are predisposed by training to reach out for experimental evidence which is reproduceable. They have a healthy and inherent respect for "absolute truth," as contrasted with opinion, hunch or even imaginative thinking. They often rely on factual knowledge, without assessing the importance of the intangible.

So, with engineers—especially industrial engineers—entering industry in India in greater numbers, it becomes necessary that we recognize the importance of the social influence, the human reaction, the group opinion, the overall social effect of their work and their philosophies.

Attitudes towards the Human Being

When industrial engineers, or those performing techniques or procedures typical of the industrial engineer, have been unthinking or careless of these attitudes towards the human being, endless strife has resulted. Many of the difficulties Fredrick W. Taylor experienced were the result of his own personality traits, we are told, because his appreciation of the

human influence and the importance of considering it were nowhere near the level we maintain in this respect today. The consequence has been that even 50 years after the time in which he worked, workers still are found and unions are still active in propagating the same anti-time study ideas that were used in Taylor's day, and the same objections are held against it as were held 40 years ago.

The recognition that the human aspect is important is a new concept, and one which is not yet fully understood. The reaction in many quarters, particularly among certain Union representatives, somewhat resembles the results of the great scholar Pavlov achieved on conditioned reflexes. Lower animals cannot speak in the language of man, but in the language of behaviour. Much of their conspicuous behaviour is concerned with food. It was with food that Pavlov began, and with the physical symptoms of salivation. He inserted a cannula into the salivary duct of a dog and observed the secretion that was stimulated by the presence of food. Ordinarily many things unconcerned with food, as objects seen, sounds heard, produce no effect on salivation, but Pavlov observed that if a certain pattern or a certain sound had been systematically introduced to a dog at feeding time, then the display of the pattern or sound was sufficient to excite salivation. That is, the reflex of salivation was conditioned by a past association.

In the field of industrial engineering we have something analogous to the reflex responses whose emotional content is presumably very strong. The complicated antecedents which are needed to produce a conditioned reflex of the Pavlov type generally centred around something important to the life of the individual ; a job, (which means food in an ultimate sense); and income ; job satisfaction ; sociable working associates and supervisors, etc. The work of the industrial engineer is full of these

"triggers", which may bring into action this conditioned reflex. For instance : workers have heard that workers in another factory have been 'retrenched.' Why ? They hear of time study, or piece rates, or other items of like kind. So when their management considers introduction of new management techniques in its plant, workers immediately rise in opposition, even without knowing anything of the facts of the situation. That this opposition is based on illogical or ridiculous opinions, and may be entirely incorrect so far as the "absolute truth" is concerned, affects the situation not one bit. The fear brought out by the conditioned reflex based on false assumptions is just as real as that for which there is justification. Unfortunately the field of industrial engineering is full of words which trigger such opposition to proposed actions. Such words as redundancy, rationalization, retrenchment, industrialization, automation, labour-saving, piece-work, time study—all these words and phrases engender certain fears in the mind of the worker who has limited skills and even more limited knowledge to offer an employer. How did all this come about ? Why should man regard devices created for his benefit as enemies of his welfare ? Why should logic be so unavailing against such seemingly illogical behaviours ?

One must return to the understanding of the first industrial revolution—and consider the impact of the second industrial revolution—in order to achieve an understanding of what is behind this attitude.

The First and Second Industrial Revolutions

If one assumes that man is now faced with social problems by the development of automation and related forces, it is correct to point out that this is not the first time that this has happened—it is usually considered the second. The first industrial revolution started in the 18th century, at a time when Newton's scientific techniques were already well developed, but

with applications not much beyond that in astronomy. It was apparent to all intelligent scientists that the new techniques were going to affect profoundly other sciences. Although developments in the fields of navigation and instrument makers preceded the actual industrial revolution, the main industrial revolution began with the invention of the steam engine. Although crude engines had been used for pumping water from mines, Watt's engine found use in the factory itself. Thus the steam engine had a social influence by eliminating the brutal human or animal labour used for pumping water from mines. The slavery which this labour represented was eliminated and a great humanitarian step forward was created.

The invention of the steamboat gave further impetus to the industrial revolution. The steam engine in the ship and in the locomotive had a great contributing factor in this respect.

Next the industrial revolution entered the textile industry. The textile industry was a sick industry, and even before the invention of the power loom and power spindle the condition of workers was most unsatisfactory. Their output was far less than required. The first textile machines were for hand operations, although the use of horsepower and water power followed quickly. The mechanization of industry, in general, is well illustrated by the events in the textile industry. There was begun a transfer of workers from the home to the factory and from the country to the city. There was an exploitation of women and children in brutal fashion. The explanation of this seems to be that the new techniques had produced new responsibilities at a time when no code had yet arisen to take care of these responsibilities.

Part of the difficulty which arose, however, was the result of purely technical characteristics in the early industrialization, rather than from moral iniquities. One of these characteristics arose from the inefficiency of the steam engine,

which, being uneconomical, encouraged large scale operations—large factories and the use of centralized large quantities of looms and spindles run from one large engine. Power was transmitted by long shafts through multitudes of belts in a large shed, belts being connected to individual machines. One may still see such methods in some parts of the world. Among other factors, this had a destructive effect on the cottage industry which was so prevalent in those days. With modern individual drives by electric motor, with high efficiency, in certain parts of the world it is feasible to return to cottage industry again. Of course, it is recognized that the factory system started before the machine system, as industrialists found it useful to maintain high discipline and in keeping up standards of production. Both lack of discipline and low production were notoriously prevalent in those days of cottage industry.

The development of large, central factories created social problems, in crowding in urban areas and rural de-population.

Social reactions to the advent of the machine and its potential substitution of human labour had violent effects in certain areas. The term "Luddite" is frequently heard these days, in reference to the notoriety aroused by the leadership of Ned Lud, an idiot whose gangs roamed the countryside in England breaking up machines, for fear of their potential harmful effects on the employment of workers in the textile industry.

In these days, when we find ourselves in the second industrial revolution, and history seems surprisingly to be following the established pattern of casting out old skills faster than new skills may be created to replace them. The resulting fears and social upheavals are predictable. In advanced industrial areas of the world, the reactions are more closely controlled than in less advanced industrial countries. The fears are basically the same, however, and

it is common that people have sought to shield themselves against the effects of sudden changes in industrial developments by insisting on social benefits and gratuities, unemployment pay, doles, and the like, to soften the effects of unexpected changes. The Luddites have, fortunately, not arisen a second time, and one assumes that somehow the world has advanced in the past several centuries, for we see no gangs breaking up labour-saving machines in these days in any part of the world. Translation of the benefits of industrial advancement into advantage not only for a few industrialists but to the working population in general is not an easy task—no matter how sincerely those concerned apply themselves to the solution of this problem.

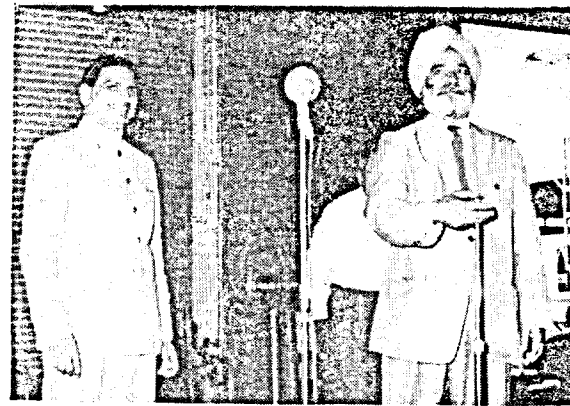
The sharing of benefits achieved through modern industrialisation is one of the outstanding world problems, in fact, for the differences in standards of living between advanced Western countries and some of the less advanced Eastern countries is shockingly great. It is expedient that all men devote themselves to the solution of this problem.

Of course the idea of making operations automatic is not particularly new. The use of the automatic screw machine, for instance, is widespread in India, and for quantity manufacture of screws no manufacturer would think anymore of using an ordinary lathe. This development is a result of the first industrial revolution.

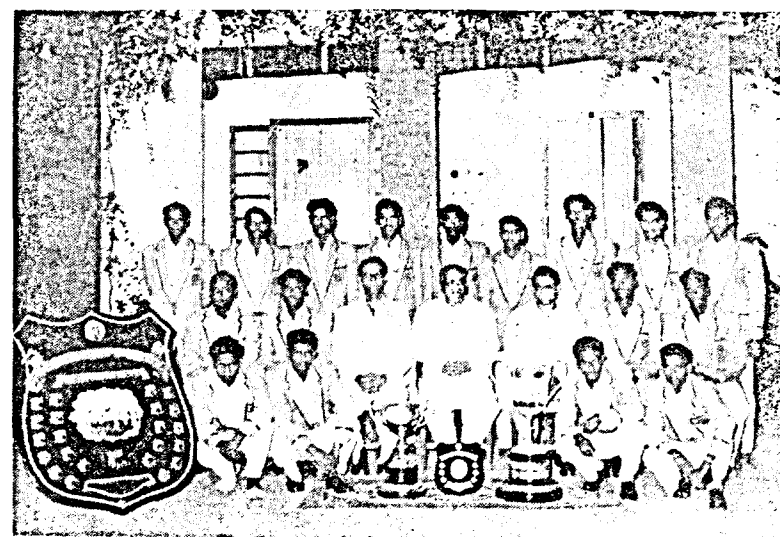
If, as some people tell us, we are now in an early period of the second industrial revolution, it is difficult to establish where the first left off and the second began. The effect of the first industrial revolution was to displace man and beast as a source of power, and in the countries where industrialization is advanced, for example, the best the man with a pick and shovel can do is clean up after the bulldozer has done its job. In all important respects,

(Continued on page 45)

HIGHLIGHTS OF THIRD PRODUCTION YEAR



The Sixth and last assembly line to go into production, was inaugurated by Shri Karnail Singh, Member/Engineering on 9-1-1958



The Foot-ball Team brought victories to I.C.F. in a number of tournaments

HIGHLIGHTS OF THIRD

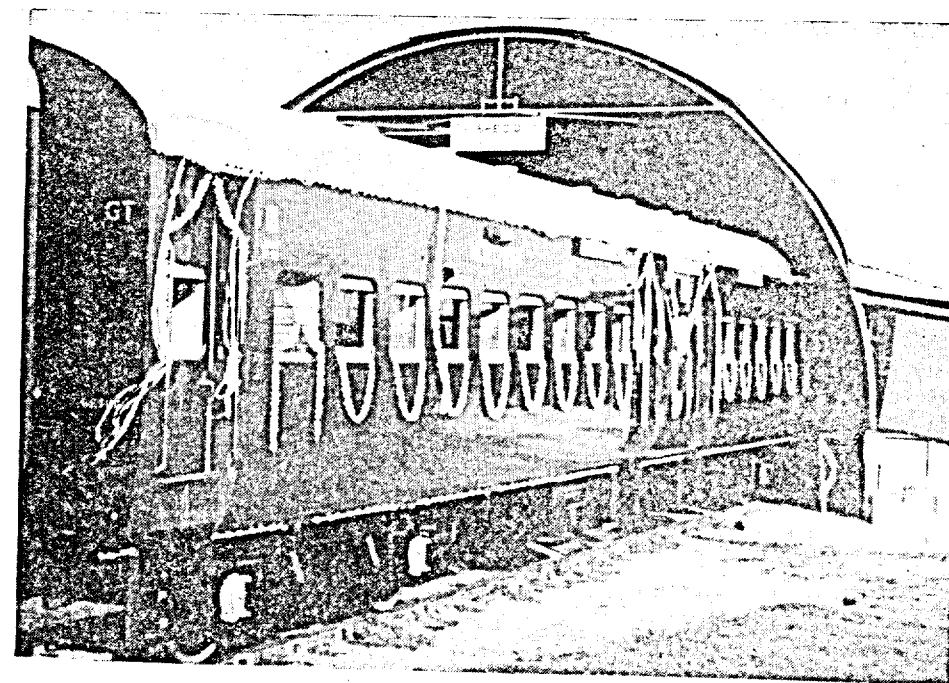
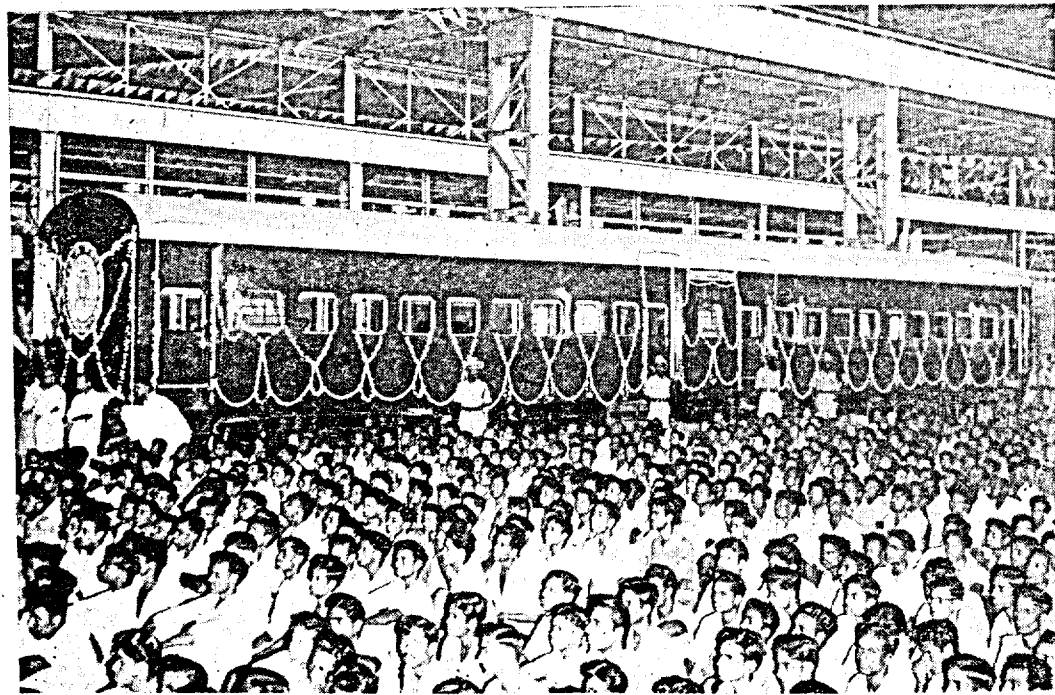


The 200th Shell to be assembled in the Factory was launched by Shri Jagjivan Ram, Minister for Railways on 15-10-57

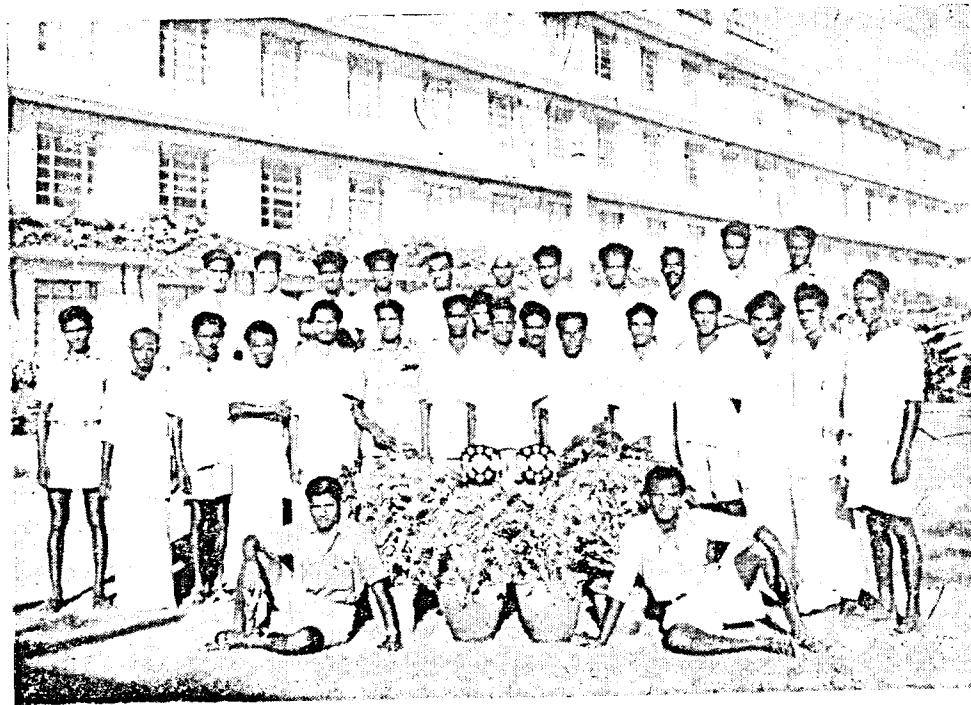
PRODUCTION YEAR



The 100th Coach to be furnished by the Furnishing Unit was launched by Shri K. Swarup, Chief Administrative Officer on 19-6-58



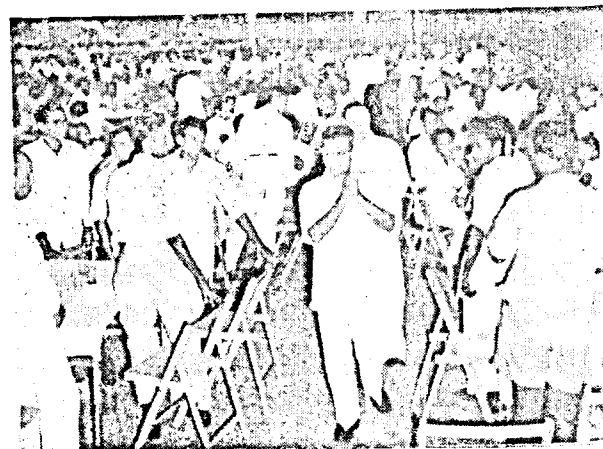
HIGHLIGHTS OF THIRD PRODUCTION YEAR



The Garden Staff brought laurels to I.C.F. by winning the First Prize, for the third year in succession, in the Industrial Garden Competition



Shri Sadagopan, CAO(R), retired from service on 18-3-58



Shri Rajagopalan, Dy. CME/Furnishing, left on transfer on 20-6-58

(Continued from page 40)

the man who has nothing to sell but the muscles in his back and the sweat of his brow has nothing which anyone will pay anything to buy.

Logically one can see that the first industrial revolution had a tendency to free man from his shackles by making the machine to replace him and restore to him the dignity which we consider the right of all human beings.

With the advent of mechanization came the birth of the industrial engineer. Industrial processes became complex, and the complexity of industrial management rose in geometrical proportions as new processes were developed. A need existed, and the need was fulfilled. Engineers with specialist knowledge in the subject of industrial management, the techniques of systematizing and controlling the processes of industrial management for achieving high productivity—these persons became vitally necessary as the nature of industrial process moved away from manually-performed operations to mechanically-performed operations motivated by electric power and performed at vastly accelerated paces.

The field of industrial engineering owes much to the techniques of time study, developed by Taylor, and motion study, developed by the Gilbreths. Over the years following new and more objective techniques have been added by which the management of industry has become more strictly controlled, and efficiency has become attainable even with the most complex industrial operations and processes.

Yet great difficulties in the social respect arose, even in the early days of the pioneers and the earliest techniques. Taylor's difficulties with labour representatives are well documented, and are matters of official record in U.S. Congressional Records. The unpleasant relations resulting from the reactions to Taylor's work actually caused the technique of time study to be outlawed from all U.S.

governmental institutions such as arsenals, laundries, post offices, and other institutions from approximately 1913, when Taylor's critics were most dominant, to 1945, when with the conclusion of World War II, elimination of the old restricting legislation finally was achieved.

Now in the U. S. time study is used widely in governmental institutions, and vast savings in money and improvements in operating effectiveness have been made possible.

As techniques for improving industrial efficiency have been developed or adopted in industry, the industrial engineer has been in the forefront, advancing and applying these techniques. The troubles of time study are not yet forgotten, but are largely secondary in the modern day. The concentration now is on automation, electronic processing and control, and like advanced methods, while the industrial engineer talks about and works with operations research, statistical methods, and other techniques which did not exist at the time of Gilbreth and Taylor.

Acceptance of the Industrial Engineers' work

To suggest that there has been improved social acceptance of the industrial engineer's work comparable to the technical development of his tools would be somewhat questionable. The industrial engineer unlike his counterparts in other branches of engineering cannot perform his job without regard to the human effects or reactions. The machine designer may design a machine without much thought of the individual who is going to operate it, except for the placement of controls and levers—and the industrial engineer has even had to take this matter under consideration—the machine designer pays so little attention to it. The industrial engineer who sets production standards for the machine after it has been produced is in a more critical position, however, than the designer of the machine. He works closely with the operator of the machine and his work

must be acceptable to that individual. So he must pay close attention to the effect of his works.

If he suggests the automation of a given series of operations, more than mere mechanical design is concerned. Workers' Unions have been known to regard automation as a sword of Damocles hanging over the head of the working population of the world, threatening to divide it into two parts—the overworked and the jobless. That this is an illogical and incorrect concept may be recognized by you, but that knowledge will not dispel the point of view.

Your concept may be that automation is not a new phenomenon, but rather a logical development of the mechanization begun during the first industrial revolution. The unions, you will say, should not oppose automation but should see that their workers share the benefits obtained, and that their interests are safeguarded. This, you will suggest, can be done by—

- (1) Controlling the changeover to automation so that any resulting unemployment may be quickly absorbed.
- (2) Securing wage increases in compensation for the higher skills automation requires.
- (3) Reducing working hours.

This you will recognize, insures that purchasing power keeps pace with increasing wealth—and everyone benefits.

Thus in theory the industrial engineer is provided with a reasonable justification for the use of his tools and techniques, and if people concerned could be made to be "reasonable" he should be able to carry out his professional tasks without major difficulties.

The industrial engineer as a justifier of his operations has displayed much less skill than

he has in the exploitation of his technical tools. In other words, he can do his job much easier and better than he can explain why, what he does is right and good for those concerned.

This, of course, might lead us to conclude that we should arrange for the industrial engineer to be taught the art of self-expression, or of argumentation, so that he could explain and justify his works as well as he performs them. Before accepting such conclusions, however, it is well to refer once again to the definition of industrial engineering.

Industrial engineering is concerned with the design, improvement and installation of various systems of men, materials and equipment. To do this it draws upon certain specialized knowledge in various branches of mathematics and engineering, so as to analyse design, specify, predict and evaluate results. Even this advanced definition says nothing about the industrial engineers having to be highly skilled in the art of argumentation, of having fully advanced skills in the social sciences, or of being responsible for the welfare of the persons affected by his professional work.

The medical doctor must operate at times with the full knowledge that a certain percentage of his patients will not survive; the legal practitioner must plead his client's case even though he recognizes that he may likely lose the case. The industrial engineer must wield his tools and techniques also, even though certain individuals in the industrial enterprise concerned may be adversely affected. To do otherwise would be to accept responsibilities outside his scope of authority. It is natural that certain people will die from an operation; it is natural that certain persons must lose their legal cases; it is natural that certain persons should be adversely affected by the work of the industrial engineer. To stop one's professional activities because of this condition would be to sacrifice the major benefits in order to avoid the minor losses.

During the American Civil War, Abraham Lincoln had the problem of choosing and directing his Generals. One of them was George B. McClellan, commonly referred to as "the young Napoleon." He was a politician's dream of a General. He was smart, popular, charming, and a good administrator and organizer, beloved by his troops, he had all the qualities of command which catch the public eye. But he had one serious deficiency: he would not fight. After visiting the battlefield in 1862, he wrote to his wife:

"Victory has no charm for me when purchased at such a cost." He over-identified himself with his men. Because he did so, they adored him, but equally because he did so, he could not fight wholeheartedly. He forgot that the primary object of fighting is to win victories and that if men have to die in the process that is war. He wanted to think of war as moves on a chessboard, a game that could be played without casualties. In November, 1862, Lincoln relieved McClellan of command and never employed him in the field again. Later, speaking of Ulysses S. Grant, who finally directed the successful Union effort, he said, with a thought of McClellan, "I can't spare this man. He fights."

In industrial engineering, also, if social benefits are to be secured, the important characteristic is that he "fights"—other attractive characteristics are not enough. He also must avoid trying to think of his task as a chess game to be played without casualties. As in war, attaining the most good for the maximum number of persons is the major task—despite the minor losses it entails. This the industrial engineer must never forget.

If the industrial engineer is baffled then as to how he can justify performing his task in the light of potential losses to isolated groups of individuals, he should reset his sights so as to keep in view the gross good rendered for the many, rather than the difficulties created

for the few. The task of the industrial engineer is to improve the efficiency of the industrial operations in his organization. By doing so he creates the only conditions under which the standard of living of the workers in the shop may be improved. He creates the conditions by which workers may be made productive. If doing so for the good of the greater group means that unnecessary inefficiencies are removed, this is a natural process which cannot and must not be impeded. Efficient operations are the only solution to a low productivity and the low standard of living it produces.

The industrial engineer has good antecedents and a host of authorities who can readily justify such a point of view. One of the concepts associated with the work of the industrial engineer may be used for an illustration of this—namely the strong drive throughout the world for "productivity." The word *productivity* is used in this instance as synonymous with "high productivity" and everyone agrees that productivity is a good thing—without in many cases being able to define what it is. A hypothesis which is closely related to this ambition is that productivity on either a national scale or local industrial situation can be materially improved through the improvement of muscle effort.

A brief examination of this hypothesis should reveal some items of interest to the industrial engineer. If the U.S. or other highly industrialized countries are more productive than some less fully developed countries, it is not necessarily because the Americans work harder than anyone else. On the contrary, they are likely to work less hard and use their muscles less for industrial effort than do other people.

Peter Drucker has observed "..... if we know one thing, it is that increased productivity, in the modern economy, is never achieved by labour. It is always the result of doing away with muscle effort, of substituting something else for the labourer."

Increasing productivity must rise above the use of gadgets and instead must inspire a dynamic transition from the use of human effort to mechanical efforts. Just to prove that this is not a theoretical matter I am discussing, I recall in a factory in India, I visited some time ago, a sign adopted by the safety department to exhort the men to work safely proclaimed "*Productivity is never achieved by machines—only by men!*" We can agree that the situation is most likely to be the exact opposite.

Related to this is a second hypothesis—also false—that the task of industry is to *create* jobs. We can agree that the task of industry is to *eliminate* jobs. We can agree that the task of industry is to *eliminate* jobs—not to create them. The task of industry is to reduce the number of jobs needed to do an operation. Cost varies with time taken and costs fall as time taken is reduced. The company which permits itself to be overloaded with workers just for the sake of giving employment, or using large quantities of human effort where mechanical effort could be substituted, will never become an efficient operation and may eventually be forced by competition to improve its methods or leave the market. Living standards rise as jobs are eliminated.

As Christopher Fry says in one of his plays: "Breaking and building in the progression of this world go hand in hand."

If I may suggest a philosophy by which one may be guided, let me suggest the following as appropriate: "*Progress is made only when fear of the effects of change is less than the fear of the consequences of existing adversity.*"

The social responsibilities of the industrial engineer, therefore, are to do the greatest good for the greatest group of people. To explain

why it is so, however, is not his responsibility, and he can probably never hope to be very successful in doing so. Nor is it necessary that he should do so. It is the task of the Union to look out for the welfare of the individual worker, and the task of management to look out for the effectiveness of its operations. The two are not irreconcilable, but the responsibilities are distinct, and the industrial engineer is primarily concerned with the latter.

Relation to Indian conditions

I have spoken in general terms, however, which in certain respects may not pertain specifically to Indian conditions. The effect of automation is not yet one of the major problems here. But others are just as important. Applications of time study and motion study are still in an early stage, and problems are being created which are just as important as those created in other countries by newer techniques. The responsibility of the Indian Industrial engineers—few as there are of them—is no less than that of his foreign counterpart. He must work in an environment which sometimes is hostile, with people who do not recognize, and sometimes belittle, the importance of his work, and with managements which are fearful of advancing the techniques common to industrial engineering. That this is a difficult atmosphere in which to carry out professional work is no secret, and those who enter the field are courageous proponents of a worthy profession.

There is no easy way out, however, there is no simple solution—no magic formula. The opportunities for social improvement are greater—or at least as great—in India than in any industrially advanced country. One must hope that the efforts will be proportional to the potential good, for nothing but the most strenuous efforts are adequate.

Shop Safety

[Extracts from the Industrial Safety and Health Bulletin (January-March 1958), issued by the Chief Adviser Factories, Ministry of Labour and Employment, New Delhi.]

1. *Misuse of grinding wheel*: A maintenance mechanic wanted to cut a length of thin wire from a coil, and in order to save himself the trouble of fetching his cutters he endeavoured to part it on a grinding wheel. The result was that part of the wire came into contact with the projecting spindle on which the wheel was mounted, was quickly wrapped round it and then round the third finger of the man's right hand, which was drawn up against the spindle and severed by the wire.

2. *Compressed Air Dangers*: An accident involving two workmen which ended in one man's sight being permanently impaired was no doubt the result of ignorance provoked by an example of bad practice.

One man, whilst engaged in the dangerous practice of blowing dust from his clothes by means of a blast of compressed air from a nozzle, was asked by the other to blow out dust from a used milk bottle. The nozzle was applied to the mouth of the bottle and almost immediately the latter burst into fragments.

It is imperative that workmen be instructed about the dangers attendant upon the use of compressed air and the strictest supervision and control over compressed air equipment is necessary to ensure that incorrect and unauthorised use of such apparatus does not arise.

A jet of air at high pressure can have devastating effects, and there have been cases where the air stream, or some substance propelled by it, has penetrated a person's body with the most serious consequences.

3. *Nitrogen Dioxide and Ozone Concentrations in welding operations*: Welding operations give rise to two injurious gases namely nitrogen dioxide and ozone. The maximum allowable concentrations of these two gases have been placed at 5 parts per million and 0.1 part per million respectively.

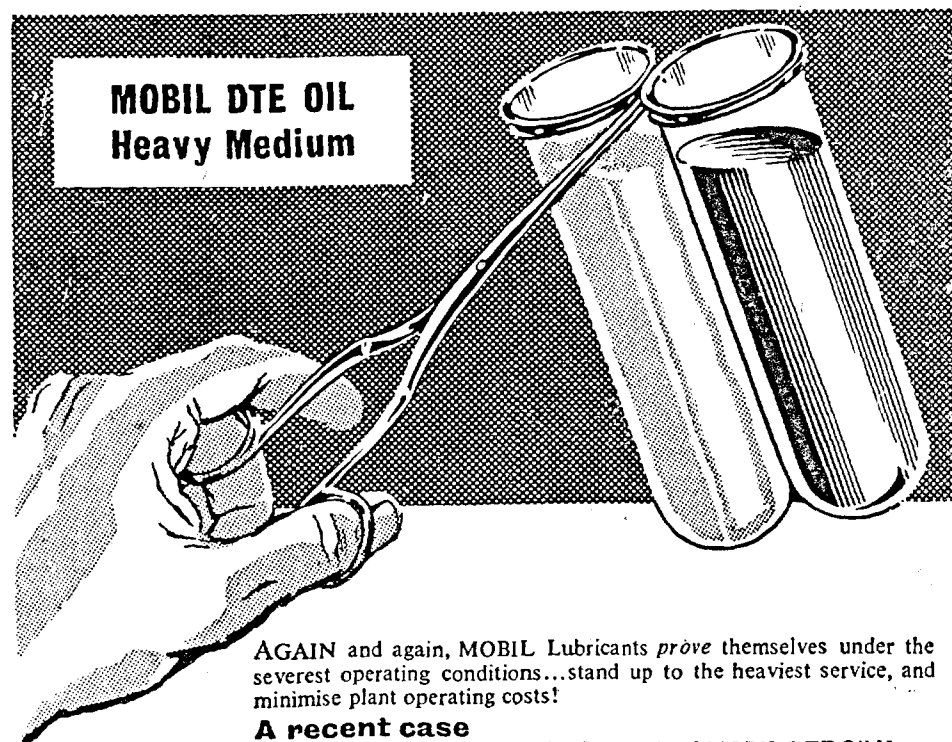
Using suitable analytical methods, the concentrations of these two gases were determined in actual working atmospheres, samples being taken close to the welding area and also within helmets worn to protect the welders. —Nitrogen dioxide was determined in oxy-acetylene metal-arc and in argon and carbon dioxide gas-shielded welding while ozone was determined in argon and carbon dioxide welding only.

Nitrogen dioxide was found to be produced by all operations, the quantities varying with the operations. While in helmet concentrations were minute, significant concentrations were encountered in the fume at a distance of six inches from the arc. With good general ventilation, however, as when conducting welding in large open areas, these concentrations should get rapidly diluted to safe levels.

Ozone was found in all gas-shielded arc procedures investigated. Quantities found at radial distances of two feet from the arc were often greater than those found at 6 inches from the arc, while in helmet concentrations were of the same order as those found at two feet distances from the arc.

The precautions which have been recommended for many years past in connection with welding operations should provide adequate control of exposure: welding should be done in large open areas with good general ventilation and, if it has to be done in small enclosed spaces, local exhaust ventilation should be provided.

Over 1,00,000 hours of service —and still in top condition!



AGAIN and again, MOBIL Lubricants *prove* themselves under the severest operating conditions...stand up to the heaviest service, and minimise plant operating costs!

A recent case

Recently, our laboratory examined a sample of MOBIL DTE Oil Heavy Medium drawn from a 3000 HP steam turbine in an Ahmedabad plant. This oil, used for the initial fill up 26 years ago, has seen *1,24,405 hours of service*—make up required was only 8 to 9 gallons per month. The tests proved the oil was still in top condition, *fit for many more years of service!* See for yourself how the used oil compares with its original specifications:

	Sample	New Oil
Specific gravity at 60°F	0.881	0.879
Saybolt viscosity @ 100°F	301	290/300
" " @ 210°F	53.4	52.8
Neutralisation value IPT mg. KOH	0.10	0.20 max
Water	Trace	
Oxidised oil and sediment	Nil	

Expert technical advice

Correct lubrication can cut costs and improve performance in your plant. Why not call on our Technical Department to help you with your lubrication problems. Remember, their advice is *free*—and it's backed by 92 years' experience in the field of industrial lubrication!



STANVAC powers progress!

STANDARD-VACUUM OIL COMPANY (Incorporated in the U.S.A. with Limited Liability)

Bombay • Ahmedabad • Indore • Nagpur • New Delhi • Lucknow • Jaipur
Chandigarh • Calcutta • Madras • Bangalore • Secunderabad • Madurai

IGY AND THE SATELLITE PROGRAMME

(This feature of topical interest is released through the courtesy of the USIS—Ed.).

How the idea of IGY came into being

IGY of which satellite launching is a vital program represents an outstanding achievement not only in the advancement of science and man's control over his environment, but also in international co-operation and understanding.

The beginnings of the IGY go back to 75 years to the First Polar Year in 1882–83. Fifty years later, in 1932–33, scientists of 12 nations carried through the Second Polar Year, and it was anticipated that further polar years would be organized every 50 years from then on. However, the rapid development of science during ensuing 20-year period changed this picture.

Early in 1950, a small group of scientists meeting informally at Washington, suggested that the Third Polar Year be held 25 years after the Second. This group pointed out that the United States and the scientists of the world could not wait until 1982 to replenish their warehouses of scientific data of man's physical environment.

They observed that a period of intense solar activity was predicted for 1957–58 and that this would provide unusually good opportunities for scientists to observe geophysical phenomena in the earth's atmosphere. In the succeeding months the proposal of this small group was brought here several international scientific organizations and was strongly endorsed by all of them.

At a meeting of the Executive Board of the International Council of Scientific Unions (ICSU) in October 1951, a special committee was formed, later to become known under its French title, Comité Spécial de l'Année Géophysique Internationale (CSAGI). It was

charged with the duty of drawing up preliminary plan for the undertaking.

In 1952, at the general assembly of ICSU, the scope of the "Year" was expanded to include not only the north polar regions (as in the First and Second Polar Years), but the entire earth. All countries were invited to establish national committee of scientists to prepare national programs which their countries would carry out as part of an overall program to be co-ordinated by CSAGI.

In 1954 and again in 1955 and 1956, the programs developed by scientists were examined in meetings of the CSAGI, and out of these sessions a world-wide program was evolved.

On December 1, 1954, the first phase of the United States program was launched with the dispatch of the U.S. Atka to the Antarctic to study sea-ice conditions and to establish a site for an IGY station in Little America. This was the first major step taken by any nation to prepare for the "Year's" scientific activities.

The knowledge that will result from the studies to be made during IGY will have very practical value. It has been estimated, according to Hugh Odishaw, executive secretary, U.S. National Committee for the International Geophysical Year, that the practical value of the new knowledge obtained during the Second Polar Year in 1932–33 could be, comparatively, more than 1,000,000,000.

Until December, 1956, the U.S. Congress had appropriated \$39,000,000 for the American effort during the current IGY. Many millions more are involved in logistics support, which will be provided by the U.S. Defence Department. Major scientific institutions are collaborating.

Scientists are studying the aurora and airglow, cosmic rays, geomagnetism, glaciology, ionospheric physics, longitudes and latitudes, meteorology, oceanography, rocketry, seismology, and gravity, and solar activity, and participating in earth satellite observations and World Days—every discipline and special project encompassed by the IGY.

IGY, which began July 1, 1957, will continue until December 31, 1958 and more than 5,000 scientists of 64 nations are co-operating to carry out its numerous inquiries to obtain information about the earth, the oceans, the atmosphere, and the sun.

The history of the U.S. satellite programme goes back to July 1955, when President Eisenhower's Press Secretary, James G. Hagerty, surprised the world by announcing the planned launching of a satellite during IGY. Dr. Joseph Keplan, Chairman of the U.S. National Committee for IGY also informed Professor Sydney Chapman, President of the Special Committee for IGY of the U.S. programme for launching a satellite vehicle equipped with instruments to record data from the outer space.

The hints then made about the proposed satellite suggested that plans for the satellite lay somewhere along the lines developed by the non-classified studies of a young Professor of Physics at the University of Maryland, Dr. S. Fred Singer, who had already designed an earth-free vehicle model, which he had named by the word MOUSE made up of the initial letters of Minimum Orbital Unmanned Satellite of Earth.

Dr. Singer at a number of scientific meetings during the past two years had described his own MOUSE as a basketball size object to travel at 18,000 miles an hour. Thus, U.S. Dr. Singer's plan had already, prior to 1955, achieved wide recognition for its skilful design and practicability.

Description of Satellite

A satellite is constructed primarily of magnesium with special coatings to provide optimum reflectivity and absorption in the visible and infra-red portions of the spectrum. The satellite is equipped with two transmitters for the transmission of information about space. The transistorized radio transmitters will operate at 108 and 108.03 megacycles with a power ranging from 10 to more than 100 milliwatts, depending on the information transmission requirements for the different experiments. Power for this transmitter is obtained from chemical batteries, although these could also be supplemented by solar cells.

While the instruments actually fitted in the U.S. satellite now in the orbit are not yet known, the originally planned spherical satellite was to be equipped with following instruments :

- (1) Gamma Ray counter.
- (2) Electron counter.
- (3) Solar ultraviolet ray counter.
- (4) Solar X-Ray counter.
- (5) Magnetometer.
- (6) Cosmic Ray and aurora counter.
- (7) Motor and gearbox.
- (8) Rotating recording drum.
- (9) Recording head.
- (10) Storage battery.
- (11) Transmitter and radar beacon.

Launching of Satellites and Rockets

Satellites are not, however, launched into space unaided by any mechanical instruments, but are first mounted on rocket vehicle and then launched.

To trace the history of modern rocketry, the work of American physicist, Prof. Robert H. Goddard, who wrote a memorandum of rocket theory published in 1920 by the Smithsonian Institution of America is important.

German Mathematician, Prof. Oberth, wrote another treatise on rocket theory. Goddard had gone as far as investigating the possibility of a rocket shot to the moon, unmanned of course, while Oberth took in the whole field of space travel. His book was published first in Munich in 1923.

V-2 weapons used by Germany during World War II were rocket type vehicle.

And even today all research on rocketry are based ultimately on these two works, while Soviet Scientists have maintained silence on their notable achievements.

How Does a Rocket Work ?

Basically, a rocket moves forward by ejecting from its tail a jet or flame, which consists of a stream of gas moving at extremely high speed. The jet does not propel the rocket forward by pushing on the air behind the rocket, as is often supposed. On the contrary, the jet exerts a

forward push on the rocket itself, and in a large rocket it does so with a force which is measured not in pounds, but in tons.

The simplest analogy, perhaps, is that of a sealed can containing gas under pressure. In such a can, nothing moves. If, however, the right-handed end of the can is removed, the gas streams out to the right, and the pressure on the left-hand inside end of the can pushes the can to the left. This is very much what happens in a rocket.

The jet pushes also on the air behind the rocket, but this is not important. In fact, it serves only to slow up the jet and to decrease the forward thrust on the rocket. A rocket operates better in a vacuum and this is why a rocket engine can propel a rocket through upper space where the air is very "thin."

Air-breathing engines such as the internal combustion engines drive automobiles and conventional airplanes. The rocket is a class

With the best compliments of:

**THE GENERAL ELECTRIC CO.
OF INDIA PRIVATE LIMITED**

REPRESENTING

THE GENERAL ELECTRIC CO LTD. OF ENGLAND

by itself because it carries its own oxygen, and, therefore, can operate where there is no atmosphere.

Solid rocket fuels and a few liquids are mixtures which contain oxygen and therefore can burn by themselves. But most liquid fuels such as alcohol and gasoline, do not have oxygen, which must be supplied in another liquid, such as oxygen in liquid form. Hence, most liquid-fuelled rockets contain two liquids—a fuel and an oxidizer.

Since the burning fuels generate a tremendous pressure in the motor's combustion chamber, the two liquids must be forced into the chamber against this pressure. In some rockets, high pressure gas pushes the fuels out of their storage tanks. In this type of liquid fuel rocket the storage tanks are under high pressure, and must be as rugged as the motor. The aerobees (rockets) which are being used in U.S. for the ionosphere observations during IGY are pressure-fed liquid-fuel rockets of this type.

Inside such a liquid rocket's combustion chamber, there is just about the hottest flame generated on this planet. This heat can melt all metals and many ceramics, and it can be tolerated in a rocket only for a short time, a matter of seconds, unless there is some way of cooling the motor's walls.

A way was found almost simultaneously in the United States and in Germany in the 1930's. In the United States the invention is credited to James Wyld, formerly of Reaction Motors, Inc.

The regenerative motor, as Wyld called it, has a jacket which completely surrounds the motor chamber, making it a double-walled vessel. One of the fuels, forced through the jacket before it enters the combustion chamber, absorbs all the heat that the flame transfers to the inner wall, or liner.

Another feature of a rocket is its automatic pilot. A rocket does not carry a human pilot, and even if it did, no human could respond with enough speed and precision to manage the controls.

The basic instrument of most automatic pilots is a gyroscope, which has the characteristic of a spinning top always pointing in the same direction. In a rocket the gyroscope points upward, and the rocket tries to fly in the constant direction indicated by the gyroscope. When the rocket departs from this direction, the gyroscope detects the error and sends orders to the motor to return the rocket to the correct course. The gyroscope is the rocket's brain, the motor its mighty muscle.

Rockets Explore Upper Atmosphere

During the current IGY, rockets are also used for the exploration of the upper atmosphere, and the U.S. alone until the end of IGY, will have launched as many as 600 rockets for the purpose of this scientific achievement. Until recently studies of the upper atmosphere have been seriously handicapped because direct observations and measurements were impossible.

Instruments sent aloft by scientists in Minnesota, in Mid-Western United States, after the eruption of gigantic solar flare, detected charged particles within twenty miles of the surface of the earth. Previously scientists had thought that these streams of particles from the sun were stopped at least fifty miles out in space.

Similarly, the sun is never seen completely. A layer of ozone mercifully shuts off much of the ultraviolet radiation. Mercifully because it would be blinding. But a rocket at high altitude can photograph complete solar spectrum and thus reveal much about ultraviolet radiation.

Rocket borne cameras and electronic instruments provide eyewitness reports of conditions on the threshold of space.

Launching of Satellites into Space

Multi-stage rocket vehicle is used for launching a satellite into space, because a single rocket cannot continue its journey to the desired altitude where a satellite is sought to be propelled into orbit.

Jupiter-C IRBM has been used for launching the U.S. satellite.

President Eisenhower recently showed a television audience the nose cone of Jupiter-C that had been recovered intact after a 1,300-mile flight to an altitude of 250 miles. He then stated that U.S. scientists had solved the problem of bringing a missile back from outer space without its burning up in the dense atmosphere near the earth.

In the test, he spoke of rocket motors that were blasted from the nose at the top of flight. The cone, glowing like a second-class star, started its plunge to earth at four times the speed of sound. On its descent it expelled a parachute and a balloon, which reduced downward speed. Just before hitting the water the cone ejected and fired small bombs. Their sound, heard over listening devices, and dye markers ejected into the water by the cone, aided in recovery of the missile part.

Sixty-five feet high and nine feet in diameter, Jupiter-C is a highly successful missile. The missile resembles a bullet in shape, and the liquid rocket engine, which burns alcohol and liquid oxygen, provides power for this successful missile.

The satellite had been put into the nose cone of the last-stage rocket, which eventually placed it in its orbit around the earth.

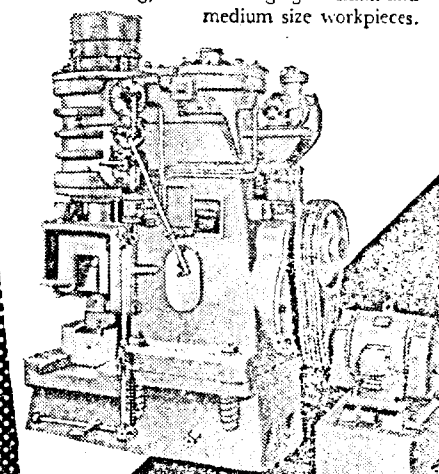
Three of the U.S. scientists have played a vital role in the development of the U.S. satellite now circling round the earth. They are: Dr. William H. Pickering, Dr. James V. Allen, and Dr. Wernher von Braun.

BÊCHÉ

PNEUMATIC DIE FORGING HAMMER LG 6

WEIGHT OF TUP 660 lbs.

In latest execution for high production and economical die forging, with machine body of sphero special casting, with shorter and reinforced tup, equipped with servo-motor to operate hydraulically the pedal control for easy and continuous regulation of blows. Capacity 120 to 1430 mkg per blow, with 220 to 130 blows per minute. Eminently suitable for Roll Forging, Bending, and Die Forging of small and medium size workpieces.



SOLE DISTRIBUTOR
FRANCIS KLEIN & CO.
PRIVATE LTD.
1, ROYAL EXCHANGE PLACE, CALCUTTA
SHOWROOMS: ALL INDIA AGENTS

Resident Engineer in South India:

I. S. SOMASHEKAR

10 Prithvi Avenue, St. Mary's Road, Madras 18

Gravity and Revolution of Satellite

A satellite, after it has been propelled by rocket-vehicle into orbit in outer space revolves under the law of gravitation round the earth unaided by any mechanical apparatus or instrument attached to it.

There are several ways in which a package of instruments could be tossed into space. Before discussing them something must be said about gravity.

"It works like this : If a missile fell from a height of 100 miles it would strike the ground with an impact velocity of about one mile a second. In reality it would be slowed down by air resistance, but that is another story. Conversely, a rocket which attained a speed of a mile a second (3,600 m.p.h.) would rise to about 100 miles. Many V-2 rockets have done this."

"If a rocket, or a rocket assembly, could reach a velocity of 5 miles a second (18,000 m.p.h.) it would climb to more than 4,000 miles in a vertical shot. With 7 miles a second it would not come back, for that is the highest velocity the earth's gravity could produce."

"Compare the earth's gravity to a rubber band. The harder the pull (by the rocket) the farther it stretches. At 7 miles a second it snaps. But you do not have to snap it to stay in space. All these rockets fall back ultimately because they are fired vertically or very nearly so."

"It is like swinging a stone around in a rubber band. The band is stretched, but not to the breaking point. On the other hand, it is stretched enough so that it cannot pull the stone back. All it can do is to prevent it from going farther away."

"The effect is that the stone—or rather the package of scientific instrument which is the satellite—literally falls around the earth and will continue doing so for eternity unless something stops it or reduces its speed so that

earth's gravity gets the upper hand. This nice balance takes place when the rocket moves with a lateral speed of about $4\frac{1}{2}$ miles a second."

"No amount of ingenuity can change this speed requirements. But it can be accomplished in various ways."

So, the secret of the satellite circling around the earth, without being directed by any mechanical appliances hundreds of miles away from the earth into outer space lies in the velocity of the moving object—if it is below the actual requirement it cannot be propelled into orbit and it will be attracted downward by the earth's gravity, or conversely if it goes beyond 7 miles a second, it will leave the gravitational pull of the earth and get lost into outer space.

Electronic "Brain" Will Track Earth Satellites

The computing machine, dubbed the electronic brain and made by the International Business Machines Corporation, will calculate and also predict the orbit of the earth satellite.

Dr. Paul Hergot, Director of the Cincinnati Observatory and Professor of Astronomy at the University of Cincinnati, heads the staff at the Computer Centre.

The Computer Centre operates on a "round-the-clock" basis, calculating orbital information using data obtained from a number of radio tracking stations in the Western Hemisphere and from other observation points throughout the world.

The "brain" can perform about 40,000 arithmetical calculations a second, if they are not too complex.

The "brain cells" working in the machine are hundreds of thousands of tiny magnets, which can be demagnetized automatically at the "will" of the apparatus.

Operation "Moonwatch"

"Satellite spotting" by amateur gazers in U.S. is expected to make an important scientific contribution to be one phase of IGY. Under the supervision of astronomers

at the Smithsonian Astrophysical Observatory in Cambridge, Massachusetts, the amateurs have been organized into satellite observation teams.

The prototype of the spotting stations that have been set up throughout the United States has been developed in an apple orchard in Silver Spring, Maryland, a suburb of Washington.

The Smithsonian Astrophysical Observatory, designated as responsible for the optical tracking program by the National Academy of Science, is installing 12 powerful telescope-cameras in strategic areas.

Universal Dissemination of Information

Elaborate networks of tracking stations have been established throughout the world. At these strategically located points, observers will collect accurate measurements of the

satellite's movements. The effectiveness of these tracking programs will depend on reliable predictions of the satellite's shifting course.

These predictions will be made by the Computing Centre. Here, the electronic brain will calculate at lightning speed the satellite position, speed and future path. These calculations must be made with extreme rapidity because of the satellite's great speed. It will travel at a speed of 18,000 miles an hour. At this speed, it will circle the earth about 16 times every 24 hours—once every 90 minutes.

According to Dr. Richard W. Porter, Chairman of the Technical Panel on the Earth Satellite and the United States National Committee for the IGY and National Academy of Sciences, primary IGY radio tracking and precision phototelescope stations are established throughout the world. The telescopic observation



D I , A N A ROLLING SHUTTERS & ENGINEERING WORKS

Manufacturers & Specialists in
**DURABLE & TROUBLE FREE STEEL ROLLING SHUTTERS,
ROLLING GRILLS STEEL WINDOWS, COLLAPSIBLE GATES, ETC**

167, WALL TAX ROAD MADRAS 1

Phone : 3672

(H. O. CALCUTTA)

Grams : 'MIZALTOB'

stations are under the general supervision of the Smithsonian Astrophysical Observatory.

One of these observation stations is at Naini Tal; the others are at White Sands, New Mexico and near Palm Beach, Florida in the U.S.A.; Curacao, Netherlands, West Indies; Qrequipa, Peru; Villa Dolores, Argentina; Olifanstontien, South Africa; Cadiz, Spain; Shiraz, Iran; Woomera, Australia; Mitaka, Japan; and at Haleakala, Maui, Territory of Hawaii.

In India, the Naini Tal tracking station is part of the observatory being set up by the U.P. Government. The observatory is headed by Dr. M. K. V. Bappu, a Ph.D., in Astronomy from Harvard, who also heads the tracking station.

Scientific Facts to be discovered

It is planned to use the IGY satellite for the following types of experiments:

(1) Determination of outer atmosphere densities by observation of the air drag effect upon the satellite's orbit.

(2) Obtaining more accurate measures of the earth's equatorial radius and oblateness,

of intercontinental distances and other geodetic data than are presently available.

(3) Long term observations of solar ultra-violet radiation.

(4) Studies of intensities and fluctuations in intensity of the cosmic and other particle radiation impinging upon the atmosphere.

(5) Determination of the density of hydrogen atoms and ions in interplanetary space.

(6) Observations of the Stormer current ring.

(7) If possible, determination of the distribution of mass in the earth's crust along with orbital track.

In fact, the IGY satellite and rocket programs will provide invaluable knowledge of several kinds. There will be the direct data which will greatly enhance the ground-made observations and which may lead to major break-throughs in theories and understanding of atmospheric phenomena. There may also be specific new and major discoveries of terrestrial and interstellar events with these tools that reach beyond the earth's atmosphere.

YOUR DOCTOR NEEDS HELP

BY

DR. A. RAMDAS,

Divisional Medical Officer, Madras

Your doctor needs your help and co-operation to be of service to you. Having attended to the medical needs of all classes of Railwaymen and their dependents for nearly ten years, I venture to offer a few suggestions for the readers' consideration.

Medical service is essentially a personal one, the utility of which is enhanced by an understanding doctor-patient relationship. The stresses to which this Service is subjected to, at the present day on the railways, have to some extent impeded development of desirable standards of such relationship. It is in the interest of the patient as well as his doctor that each should co-operate with the other. The doctor, contrary to popular expectations, is human, with all frailties common to the human species. He may lose his temper under provocation, his patience under stress and his judgment under extenuating circumstances. When this occurs, the quality of service rendered by him suffers. A doctor deals with a mechanism more complex than the most complicated one invented as yet by man. He has a difficult job to do. He needs every help and co-operation his patients can give him. Their appreciation of his services is the only reward he looks forward to.

Here are a few suggestions you can ponder over or at least try to remember when you go to your doctor next:

Go to your doctor in time. Do not neglect a complaint in the early stages and then demand immediate attention from the doctor, pleading urgency. It is neither fair to the patient nor to the doctor.

Choose a doctor carefully and stick to him. Doctors should not be changed daily like clothes. It takes sometime for a doctor to study your constitution, its idiosyncrasies and its weak points. A sound knowledge of these is essential for successful treatment.

Do not choose your doctor only for his academic qualifications. Your personal experience of his skill is the best judge as far as you are concerned.

Be chary to accept a doctor who gives extravagant undertakings at the very first examination. Humility and cautiousness are the hallmarks of a rich experience in the practice of medicine.

If you want the doctor to give you a detailed check-up or discuss a serious health problem with you, go to him by prior engagement. Do not drop into the doctor's consulting room without an appointment. You will probably find him busy. In his subconscious pre-occupation with other work, he may miss a valuable point in your examination.

Do not enter a doctor's consulting room without getting his permission or knocking on the door. You may intrude on his examination of another patient.

Maintain a file containing medical information regarding your earlier ailments. Take this file with you when you go to consult a doctor for a serious complaint. References to the file will be useful to the doctor.

At your first meeting with the doctor, do not try to impress your official status on him. The doctor decides treatment according to the status of your disease and not by the status of your office.

Let not your official relationship stand between you and your doctor while under treatment. He is rendering you a personal service and expects you to maintain a normal attitude towards him.

Do not belittle the doctors who had treated you earlier, before the doctor whom you are currently consulting. A wise doctor knows that his reputation will suffer a similar fate if you are not pleased with his treatment. Besides, such comments are not in good taste, especially as the earlier doctors are not present to defend themselves.

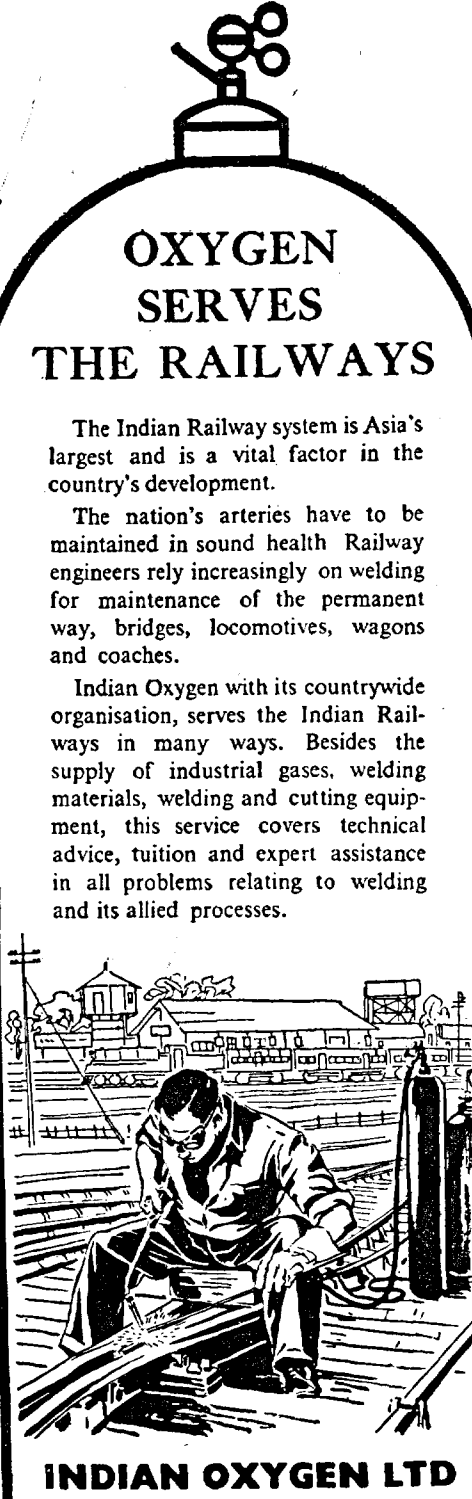
Narrate the salient features of your complaint clearly to the doctor. Answer such questions as he raises, during your narration. Do not offer your suggestions regarding the diagnosis or treatment. A good doctor will subconsciously resent these. A poor doctor may be misled by them to your detriment.

Do not exaggerate your complaints before the doctor and make them appear more serious than they seem, with the intention of getting special attention. The doctor is likely to get the feeling that you are a chronic exaggerator and may under-estimate a serious complaint when you go to him again.

Medical advice is given in good faith. Unreasonable doubts and prolonged discussions vitiate that faith on both sides.

If you are not satisfied as a patient with the doctor's advice or opinion, you are always entitled to request a second opinion. A reasonable doctor would willingly agree to such a request and help you to secure the second opinion. If he does not, you are free to consult a second doctor on your own.

Do not stay in the doctor's consulting room after you have finished consulting him. Make room for the next patient. Patients do not like to discuss their ailments with the doctor in the presence of other patients.



**OXYGEN
SERVES
THE RAILWAYS**

The Indian Railway system is Asia's largest and is a vital factor in the country's development.

The nation's arteries have to be maintained in sound health. Railway engineers rely increasingly on welding for maintenance of the permanent way, bridges, locomotives, wagons and coaches.

Indian Oxygen with its countrywide organisation, serves the Indian Railways in many ways. Besides the supply of industrial gases, welding materials, welding and cutting equipment, this service covers technical advice, tuition and expert assistance in all problems relating to welding and its allied processes.

INDIAN OXYGEN LTD

Carry out the instructions given by the doctor meticulously. Do not discontinue or modify treatment on your own responsibility. The doctor will feel nervous to treat such a patient or many even refuse to treat him further.

Keep your doctor informed subsequently of your progress or otherwise, in case you do not see him again. Do not expect him to ascertain this on his own either because you are lazy or are pre-occupied otherwise. He has other patients to attend to and it is not fair to expect him to follow up the progress of all the patients he treats.

Do not demand quick results from your doctor. Hurry will lead to worry, for you and the doctor. The reactions of the human body to disease are governed by natural laws. Nature cannot be hustled unless one is prepared to risk a mishap.

Unless there is a real emergency do not disturb the doctor outside his working hours when he is resting after his duties at his residence. The doctor also requires rest after a day's work for recovering from bodily and mental exhaustion. Nothing exhausts a doctor's patience more than an exhaustive talk outside his working hours about a non-urgent complaint which could well have been attended to during the doctor's hours of duty.

If you can go to the doctor's consulting room, do so, instead of summoning him to your residence. Remember every house visit deprives four patients of the doctor's services at his consulting room. Such thoughtless summoning of the doctor to your house is anti-social, especially now with increasing class on the doctors' services.

Patients out of goodwill offer beverages to doctors when on professional visits. Acceptance of such offers from a number of patients

in a day will upset the doctor's stomach. Besides, a fastidious doctor will be embarrassed to accept any article of food from a patient with the chance of infection being conveyed to him. Such demonstrations of goodwill from patients are unnecessary.

Do not disturb the doctor for subsequent consultations or house visits on the same day for the same complaint. Exacerbation of symptoms like fever, cough are quite common in the course of an illness. It is not necessary that every time the fever goes up a little, the doctor should be called in. If such changes are of some significance, the doctor would himself advise you to inform him.

Accept the doctor's advice when he suggests that the patient should be admitted into hospital. A doctor makes such a recommendation only when he considers that the patient's best interests are served by such a step.

It is against medical etiquette to divulge one patient's complaint to another person except in certain special circumstances. Do not embarrass a doctor with such questions. A firm doctor may even rebuff you immediately.

Remember a medical certificate is taken for granted to be genuine. An unjustified certificate renders the issuer liable to serious consequences.

Do not praise your doctor in his own presence to another doctor. If your doctor is modest he will be embarrassed. If the other doctor is sensitive, he will be irritated at such an assertive lay assessment of technical ability. This does not apply to your sober appreciation of a doctor's services.

If you had the patience to go through this long contribution, you are really patient and if you follow the advice you will be a good patient.

PHONE : 71756

GRAM : "SAFEDEAL"

for Supply of
Hard Boards, Timber, Glasses,
Mirrors, Furnitures and
any other materials



Contact

MANASUBA & CO. (PRIVATE) LTD.

82 ROYAPETTAH HIGH ROAD

MYLAPORE

MADRAS 4

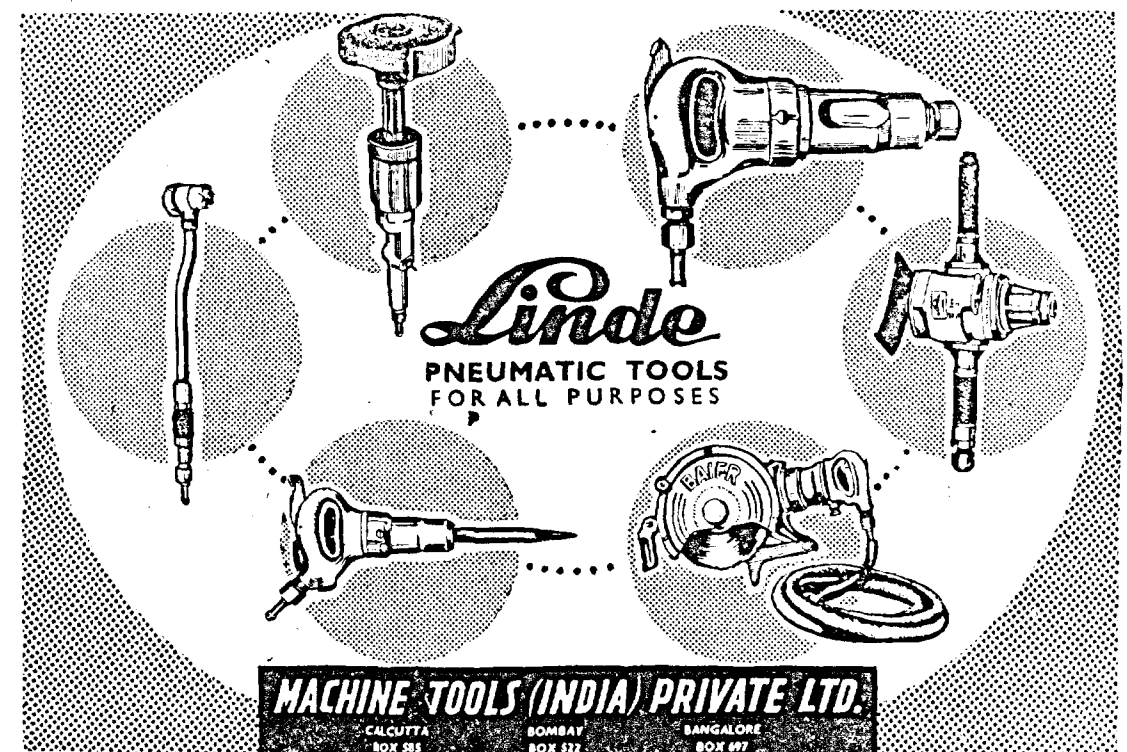
VISITORS TO THE FACTORY

Shri E. W. Isaacs, Additional Member (Mechanical), Railway Board, New Delhi visited the factory on September 4, 1958.

Five officers and ten ratings of the Indian Navy visited ICF on September 8, 1958. Mr. Michael L. Hoffman, Director of the Economic Development Institute (Organised by the International Bank for Reconstruction and Development), Washington visited the ICF on September 15, 1958. He was received and shown round the factory. At the conclusion of the visit Mr. Hoffman observed that it was highly encouraging to see a project that was ahead of its planned output and clearly ready to play a big role in India's industrial development.

Mr. Manuel Mesa from Mexico visited the factory on September 17, 1958. He congratulated himself on his visit "to these important and modern plants" which promoted the development of this country—This country which was called underdeveloped in the past, but, in his opinion, was only over-exploited.

The Economic Officers of the United States Government in India visited the ICF on September 19, 1958. They were shown round the factory. At the conclusion of their visit they remarked that the factory was an outstanding example of the progress made in so short a time by India and a great tribute to the imagination and skill of the nation.



M.T/157/53

ROLE OF SOILS IN GARDENING

BY

M. V. B. MENON

Horticultural Supervisor

Soil is truly a most precious possession of ours as from that the food of not only all the living creatures of the land but also the innumerable products of the vegetable kingdom, which are most essential for industries and the well-being of mankind, is obtained.

Agriculture depends upon the influence of a large number of factors, some controlled by man and others beyond his control. The word Agriculture, which means "cultivation of the field," epitomises the role of the soil in the production of food and raw materials for industries.

Soil is the upper layer or cap of the solid crust of the earth in which plants grow. Soil is nature's storehouse of plant food. Soil is the source from which plants draw their important requirements such as water etc., and which enables the plants to hold their roots and stem firmly essential for performing their respective functions normally. Soil is the scene of many chemical changes in the presence of air and water. So it has to receive the maximum attention of the gardener for which he must have adequate knowledge of the science of the soil. His success as a gardener depends upon the soil at his disposal and the manner in which he works it out.

How soils are formed

Soil is formed by the disintegration and decomposition of the granite rocks due to the action of several agencies such as (1) Physical or mechanical, (2) Chemical and (3) Biological.

Physical or Mechanical: (a) by heat or cold—The effect of temperature and seasonal variations result in a loosening of the texture



of the rocks in a marked manner. The disintegration of hard rocks by burning brushwood on the surface which results in the breaking of the rock along the bedding planes, facilitating the separation of large slabs or sheets of rock, is a familiar example of the manner in which such a high temperature acts upon a rock. Just as heat acts upon rocks in hot countries cold acts on them in cold countries. The cracking of the rocks brought about is the result of unequal expansion and contraction of the different minerals of which rocks are composed of.

(b) by water—The freezing of water, whether as a thin film or in large quantities, as in crevices has a very destructive cumulative effect on rocks. Water in motion is highly destructive and powerful to make rocks into gravel sand and silt or even mud.

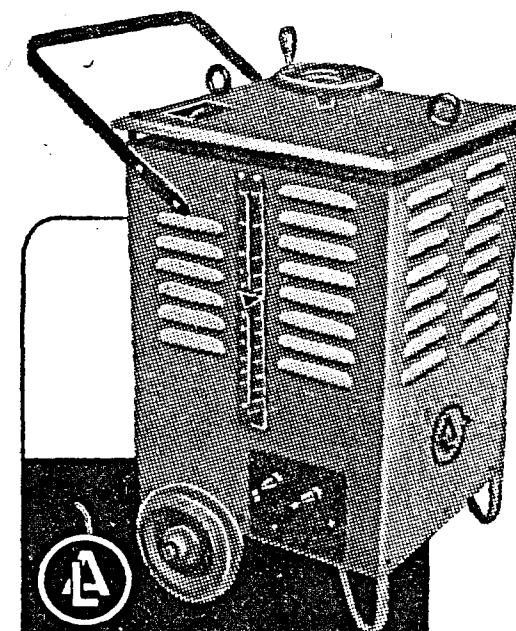
(c) by wind—Strong winds laden with sand cut into and wear away rocks on which they blow.

2. *Chemical agencies:* The atmospheric air with the active agents such as oxygen, carbonic acid, and to small extent nitric acid, formed during the thunderstorms and brought down by the rain and water by itself and by its dissolving effect, by chemical hydration, decomposes rocks splitting them into small particles.

3. *Biological agencies:* The decomposition of the vegetable growth on the surface and among the cracks of the rocks disintegrates the rocks. On the surface of the rocks many kinds of lichens and moss and the other lower order of vegetation also corrode on decaying rocks. Big plants send their roots into the small cracks and split the rock as they become bigger and bigger. The action of the earth-

worm is also an agency of soil formation. The action of white-ants is also responsible for the formation of soils. The decay and disintegration of rocks are not acts singly but jointly, leading to or opening the way for another for their progressive and respective work.

There are different variations in soil regarding texture, chemical composition, colour as they are formed from different rocks and different varieties of organic matter. Even though all soils are made up of minerals, they are to be differentiated by their chemical composition and texture. If the particles of rocks are large the resultant soil is either sandy or gravel and if they are fine then it is clayey. The particles of an intermediate size fall under the group called loam. So soil can be classified under three heads namely sandy, loamy and clayey.



VADIAL I & 2

AIR-COOLED TRANSFORMER
WELDING SETS
FOR 400/440 VOLTS SINGLE PHASE
50 CYCLE SUPPLY

These sets are engineered specially to meet the present requirements and exacting demands of modern welding processes and ensure complete satisfaction to the discriminating user. The sets have a large co-efficient of dispersion resulting in a continuous regulation of the welding current throughout the welding range. Maximum capacities of these Transformers are:

Vadial I — 180 Amps. Vadial 2 — 320 Amps.

Limited quantity available ex-stock

MANUFACTURED BY:
L'AIR LIQUIDE, PARIS

THE
ASIATIC OXYGEN
AND ACETYLENE CO., LTD.
8, DALHOUSIE SQUARE EAST, CALCUTTA-1

The soil which is called stony or gravel is a large mixture of stone, gravels, etc. (This type of soil is not suitable for gardening).

The next lower one in respect of coarseness are sandy soils, containing more than 60% sand. Sandy soils are loose in texture and easily saturated with moisture. They also allow water to pass through quickly carrying away the manurial value and leaving the soil poor in plant food. Therefore sandy soils require heavy and frequent manuring. On account of the great need of water and manure, sandy soils are described as hungry soils. The addition of clay, tank silt, green leaves, cattle manure, etc., to sandy soil will bring that to a good condition.

Agriculturally loamy soil is the best suited, on the whole, for cultivation. It is an ideal soil for the Horticulturists. They are classified between sandy soils and clayey soils. Loamy soil is rich in all the requirements for plant life. Drainage, retentivity of moisture and water holding capacity are adequate and the soil is also well aerated. It is suited for any kind of crop and all the tillage operations are generally well suited to this class of soil.

The next in order is the clayey soil. In this the sand composition ranges between 20 to 25% and the balance is dust like particles of rock. When moist it is exceedingly sticky and ploughing or digging in that condition will reduce it to a pasty mass. When it is dry it becomes very hard and difficult to break. Water cannot pass through it easily due to the fineness of the particles and it is very difficult to drain out excess of water. Clayey soil though it is bad, can be improved and brought into workable condition by adding plenty of organic manure leaf mould and sand.

There are some other classes of soil which are not of much importance to Horticulturists. These are gravelly soil, alluvial soil and peaty soil.

Other factors which influence soil condition

Humus : It is partially decomposed remains of organic matter (vegetable or human). Its presence in soil in large quantities is useful in many ways. It helps to give the tilled soil its peculiar 'crumb' structure, it enables the soil to absorb and retain moisture, it induces bacterial action making the plant foods in the soil into a more acceptable form and gives a loose texture to the soil.

Lime : Although lime is not a plant food its presence in the soil is very essential. Its action on the soil is the flocculation of clay and the improvement in the texture physically. Chemically it corrects acidity in the soil, converts potash in the soil into an useful form and helps to promote bacterial activity.

Micro-organisms in the soil : Soil is not a mass of dead materials but is one, very thickly populated with organisms of different kinds from the lower order bacterial life to the higher forms, most of which are invisible to the naked eye. Most of these micro-organisms are useful but some of them are very harmful and they cause various crop diseases—Bacterial ; Fungi ; Algae ; Protozoa ; Eel-worms (Helminths), etc., are some of the few living micro-organisms in the soil.

Bacteria : These are of two kinds. One functioning only in the presence of oxygen and the other in the absence of air and oxygen. These bacteria are unicellular. They multiply rapidly. There are many varieties such as :—

- (a) Free living bacteria (Azotobacter) which have the power in the presence of air to obtain the nitrogen of the atmosphere.
- (b) Symbiotic living bacteria (bacillus Radicicola) which fixes atmospheric nitrogen not like free living bacteria but require a suitable living host plant, with which alone it can function. These plants belong to the leguminous order and only the plants

of the leguminous order can utilise the nitrogen of the air in the manner with the help of these bacteria and can flourish.

- (c) Bacteria that can convert the nitrate to nitrates, in which plant get their nitrogen from the soil through their roots in the form of solution through water.

Fungi : Among other micro-organisms in the soil, fungi of various types are those that attack and live upon dead plants. These organisms either live as parasites on other plants or thrive on dead matter.

Algae : Algae are microscopic chlorophyll bearing plants, without roots, stems, leaves,

living in the soil, getting the requisite energy for their growth, from the sun.

Protozoa and Helminths are harmful to the soil when they increase in number.

How to improve soils : Only a few basic hints are given as this is a subject by itself. The texture of the soil can be manipulated by adding clay to sand or sand and lime to clay or organic matter (humus) to sand and clay. (2) Drainage can be provided if it is waterlogged. (3) Supply the soil with organic manure such as leaf mould, cattle manure, horse manure as and when required. (4) Supplement the organic manures with artificial fertilizers in the soil.



PHILIPS

FOR

MUSIC :: LIGHT :: ELECTRONICS



"INVERSE IN VERSE"

BY

M. V. B. S. SARMA

There was a smashing Typist in our Factory
Who flashed her looks in elliptical trajectory
Her presence created to many, corneal thrombosis
Saint or sinner, everyone had mental metamorphosis

Once there was a haughty clerk
In that naughty State of Denmark,
Who spoke like a prattling parrot
And looked like a cherry carrot
Who smoked like a Canadian engine
And ticked hard in an electrical combine :
He courted the girl from far Abyssinia
When rejected, turn'd recluse in Central Asia.

There was a thundering poet by name Varma
Who very much wished to go to Burma
He applied to Delhi for a Firm (n)
When refused, thought it was all his Karma.

There was a wife, whom at last, I acquired
For a long time, for eons, by me she was required
I know for certain you don't know about my wife
She was Palson's butter cut thro' with a knife
They murmured she looked every inch a Grace Kelly ;
Her nimble steps ? Oh, they were that of Gene Kelly.
A docile, charming, chrysanthemum-like creature

A lily white doe—crouching under my coverture
She was dainty—A veritable South Indian *Masala* curry
Report said : 'Many who saw her committed harakiri.'
All went well—same with all married couple.
Sure—absolutely whatsoever—was there any trouble
One day, God be cursed, she censored all my letters
Rather the Notes to my typist and alas ! she was in jitters
She gave me the check
And so I got the kick
Who could foresee
I would become a divorcee !

A pig had a tug with a bug
Because he had a peg from the keg
A poor teetotaller, the mug pig fell in a jug,
At which valiantly the bug did tug and lug
As the thug lady bug on the rug looked very smug.

My uncle went in disgust to Thermapylae
As none would have him for a *MAPILLAE*
A graduate from the Fagin's academy,
In principle, a staunch believer in polygamy
A political candidate whose Manifesto in election
Was a simple transplantation of population,
A lean Cyclops yet looking like a barrel,
Yes. He went to Greece with lock stock and barrel.

My cousin was married off at *KUMBAKONAM*
The *SAMBANDHEES* were served with *KARA TRIKONAM*
The bride was an expert on the fiddle
How she learnt was a Goddam riddle
She sidled to the place where lay the fiddle
Took the fiddle but in the middle made a muddle.

Someone put in the Bridegroom's coffee pot, a pinch of salt,
On sipping, the dear Cōs, the Bridegroom had a somersault.
He goes to his car : it wouldn't start
They put the spark plug in the water jug
Remember the pig in the jug ? It played with the plug ;
The plug emitted a spark and electrocuted the pig, the mug.

A CADET'S HOLIDAY AT HOME

BY

K. S. S.

Often mother sighed for her son in the Army. He had just joined but oh! so anxious about him. It was barely a year that he had left home and yet she evinced great concern over his welfare, having been the first time away from home. But she derived much consolation from loving letters he wrote home of his well-being and the training being given. Now the course was nearing its completion and the mother's heart was getting into a flutter; counting the days and fondly looked forward to his home-coming on leave due after a year's training. To her great disappointment, a supposed—to be the last letter arrived conveying the news that the cadets were being marched off to a "long camp"—destination unknown. So, "please don't reply till address from there is sent" he wrote. "How disgusting," exclaimed the mother. Four days after the letter, the younger son and daughter of the family were to see friends off and so left by car to the station. Hardly had half an hour lapsed, when in came rolling down the long drive to the house, a huge car. Mother thinking it was the son and daughter returning from the station casually took a peep at the frontage, when the car stopped. She got a fright—heavy luggage and a lank in khaki getting off the car. Sure some mistake she thought—but it was no mistake. To her surprise who should it be—her darling cadet son rushing towards her, to embrace and kiss her. For a moment speech left her and the excitement created in her be better imagined than described.

The dear mother couldn't recognise her son. He had changed considerably. "What happened about the long camp?", being choked with joy, she feebly asked. "This is it, Ma"—he said, and hugging her again kissed her. "What a cheeky joke you've played" she said

and he hopped about her and grinned. Papa was inside—hearing excited voices, hurried out from his shaving, face lathered all over and seeing a khaki-clad man nearly rushed back to his room, when the son ran up to him and gave him a tight hug—"Hullo, Papa, I have come home." Papa could hardly believe his eyes and said "This is quite unexpected." "I wanted to give you all a surprise" the son replied and Pa retired to appear more decent. He affectionately enquired after his brother and sister and on being told they were out, he felt they must have their turn of surprise too and quickly removed all trace of luggage and samans from the frontage and waited patiently in the sitting room. Soon to his great joy they returned and drove straight to the garage at the rear of the house and came shouting, through the rear entrance "When it's spring time in the Rockies, I'll be coming back to you." Mother, keeping up the joke, met them halfway and silenced them with "Sh—there's a visitor"—so both choked off and tip-toed to take a peep at the visitor. The visitor couldn't resist the excitement, up he jumped and rushed to them—and "So I have come back to you"—for a moment both got a shock—and then the shouting and the younger brother trying to lift him off his feet and thumping him and the sister saying "Why didn't you wire?" it was a real Home-coming. The army boy had come here. Mother was lovingly watching the surprise enjoyment and yet there seemed a question on her face—an algae-like growth on his upper lip. The sister, afraid to hurt his feelings so soon after his arrival, and yet not able to contain herself, blurted out "Why the tooth brush Moosh, Sir" He, with an air of pride said "This is Army style, Mum"—but Mum hated it

inwardly." Spoiled his handsome looks" she declared—he just grinned.

Soon it was lunch hour, and all got down to a hearty meal in celebration of the cadet's home-coming. He kept them interested with all the news of his training career. The language was getting flowery with the 'Bs and Ds' flying off like missiles in a battlefield. It was new vocabulary in the home—brother and sister giving looks to each other and glances at Ma and Pa Ma was punctuating all his 'Bs and Ds' with Esh-Esh-and Pa frowned dumb-stricken. What bad language thought Ma—"against religion too". But the topics were so interesting. He was describing the Army training—the routine and order—the discipline, the court-martial and punishment rolls—the "Chukkers" were killing he said—have to run round and round a huge circle, the number of times varying for various offences committed in ignorance or deliberate disobedience, the crawling snake-like, on the "bellies"—agonising and embarrassing and yet teaching them lifetime lessons to obey orders and commands of the Army—and so on, but cursing all the same with the embellishments of 'Bs and Ds'. It was too much for mother and she had to call a stop by suddenly asking "But, son, is that why you have lost so much weight?" and the brother chimed in "Must be—" "looks like a toothpick stuck up straight" and "hideous with the Army style too"—the sister declared throwing it back on him. The poor Army boy had grown thick in the training and struggling against the brother's and sister's remarks turned towards his mother seriously and putting on a deceptive sadness said hesitatingly—"No, mother, not at all—I have a disease"—Mother went livid and couldn't eat any more—Pa—with mouthful of food nearly choked and looking up with eyebrows raised grunted "Oom", while the brother and sister both simultaneously cried out "Oh! God!" But with a worried look mother asked "Whatever is it?" The Army son didn't realise the consequences of

his statement, but seeing the frightened look in his dear mother, blurted seriously "Hunger, mother". "Stupid fellow," the dear mother couldn't help saying "No wonder he's gobbling mouthfuls"—the sister didn't spare him having watched him eat. Father, greatly relieved, consoled the family by saying "Poor fellow, to cope with the strain of work, perhaps he didn't get enough to eat" and then there was a hearty laugh. All the same, the cadet son never ceased giving tall yarns of the life at the training. He seemed to have enjoyed it. To the amusement of all he said, "Shall I tell you something more?" "Oh, sure!" the brother said. "Then, listen" he said clearing his throat, "you see we have P.T. exercises everyday"—"What's P.T.?" the sister asked—"Physical Training"—"To keep us fit for life"—"Yes—go on." "So we were all stretched flat on our backs on bare ground. The instructor was conducting the exercises. Suddenly, lo and behold, our C.O. Commanding Officer" he explained lest he be asked what C.O. was "and paid us a surprise visit and we, fresh entrants got nervy. He stood perfectly erect, and looked awe inspiring, but a fine figure he was. He watched and thundered 'Lift'—up shot all the feet straight into the air, except one. Poor fellow—who knows what had come over him—fear we thought and nervous and so couldn't lift his legs. Again, the Colonel thundered more severely 'Lift' I say'. Reluctantly, in sheer fright and in obedience to an Army Order, he shot his legs straight up into the air, when a terrific explosive-like sound we heard. Poor fellow—many of us were dying to laugh—Colonel's face went red and quickly with a right-about-turn-Army fashion—he left the place—much to the chagrin of the poor Cadet. "Bloody Hell" the Colonel was heard to curse after he had gone some distance." "Chee" the sister remarked and others merely grinned.

So the days were passing on and one morning he said, "Mother dear, I have to get some

'Kit' made before I go." Mother was getting initiated into the Army language. "Certainly, have it made" and they went out to buy the required material and order the 'Kit.' They entered a shop, and the son asked the salesman at the counter "Have you O.G.?" The man blinked—thought a while and said "No—Sir, We have Poplin." "No, no" the cadet said and left the shop. They visited a second shop. There again he asked the salesman "Have you got O.G.?" "Is it for shirting, Sir" he asked politely "No, no—for suits" he replied. "Sorry, sir, we have many other varieties would you like to see, sir" and as the cadet was leaving the salesman continued, "some Gaberdine, sir"—"no, please. No, I want only O.G." "Sorry, sir—but any other, sir?" Again, mother and son walked over into another shop. Seeing a handsome young man and a respectable lady, a smart shop assistant walked up to them and enquired "What can I do for you, sir?" "I want O.G.", the cadet replied. The assistant went up to the salesman and said "Is there O.G.?" "O.G."—the salesman repeated "O.G.!" and looking queer said, "No O.G., never heard of it." The assistant strolled up to the cadet "Sorry, sir—we have no such stuff—could we show you other suitings? Just have a look—we have fresh stock—velvet Cordroy"—he kept rattling off. "No thank you" the cadet snapped, feeling pestered. "I want only O.G." Thus mother and son walked from shop to shop to a full row of shops. Every cloth shop was paid a visit—and in every shop looks of surprise were seen on every face when O.G. was asked. At last in a Karachi wallah's shop a well-dressed assistant greeted the mother "Good morning, Madam, can I do anything for you?" The son replied, "I want O.G. for Army wear"—it suddenly dawned on him to mention it was not civilian suiting cloth he wanted, but suiting for Army personnel.

The man was bewildered for a moment and repeated 'O.G.' to himself. "Yes, sir," he said. The cadet heaved a sigh of relief and the mother, too, out of sheer exhaustion. "At last we've got it" she said. "Please come along this way" the shopman called and led the way to a counter and directed the salesman to show them Khaki." The cadet felt annoyed. "I didn't ask for Khaki" he spoke roughly. Mother was terribly disappointed. The poor shopman thought that was a new name for Khaki like 'O.K.' for 'Allright'—as the Army wore Khaki mostly. "Sorry, sir" he said "we don't have that material."

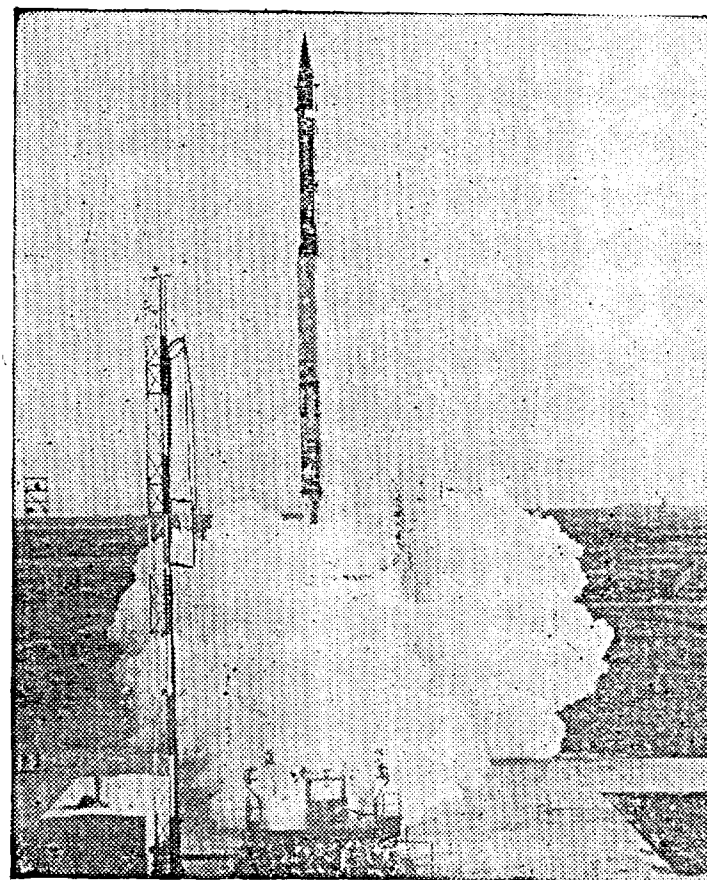
"Never mind, mother" the son said, "Sorry I troubled you so much, I'll have it made when I return to duty." Mother at last plucked up courage, as in the end she too suddenly realised that she herself didn't know what kind of stuff O.G. was, not being familiar with Army folk. "But, darling son, what is O.G. like?" "Thick like Khaki, Ma, but Olive Green in colour." Mother burst out laughing.

Soon the days fled, and the dear son felt rested and filled out. A happy holiday was spent and it seemed the end came in no time. He was happy to go too. He liked the Army and recounted often that though the life at the Services may be severe, but that perfect order and discipline was strictly maintained. That, he said was more education than what was acquired in colleges. Physically and mentally they were kept in trim. Regular P.T. exercises and periodical examinations throughout their services trained them to be men of character—good not only for themselves, but good for the country.

Similar order and discipline should be strictly inculcated even in civilian life—from a school boy to leaders of the country.

May the men in the Services set up noble examples to the World.

DID YOU KNOW ?



U. S. NAVY LAUNCHES 6.4-INCH TEST SPHERE IN VANGUARD SATELLITE PROGRAM

CAPE CANAVERAL, FLORIDA.—The U.S. Navy placed its first test sphere of the Vanguard satellite program in orbit on March 17.

In announcing the successful launching, President Eisenhower said: "The orbiting is a part of a series of tests which will be conducted prior to the launching of Vanguard satellites as part of the United States' participation in the International Geophysical Year."

The test sphere, measuring 6.4 inches in diameter and weighing only 3½ pounds, is carrying two radios one powered by solar cells designed to draw their energy from the sun and the other by conventional batteries.

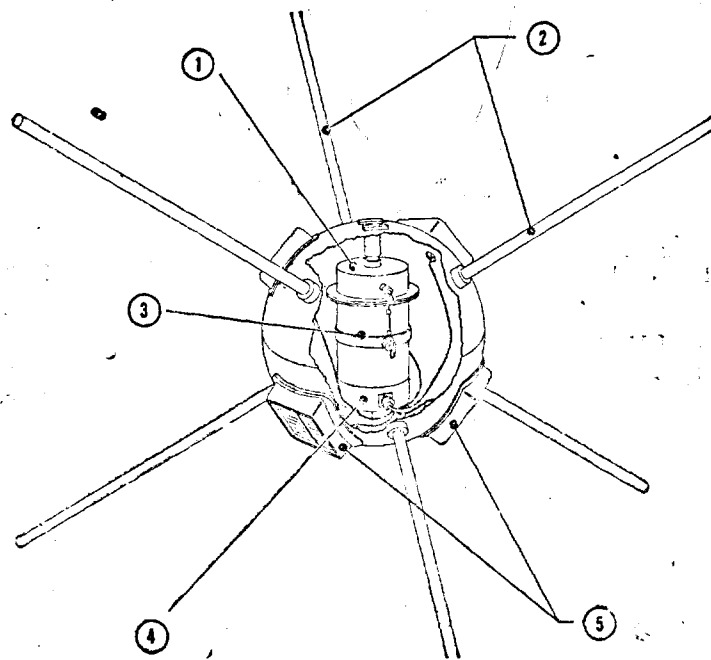
Operating on 108.03 megacycles at about 5 milliwatts, the sun-powered radio is sending back information on the temperature of the satellite's aluminium skin. The other is broadcasting internal temperatures on 108 megacycles at 10 milliwatts.

Explorer I measures 80 inches in length and 6 inches in diameter. It includes the instrument package and final stage rocket. The third stage of the Vanguard rocket, measuring 5 feet in length and 18 inches in diameter, may also be orbiting behind the test sphere.

Overall length of the Vanguard rocket, built by the Martin Company of Baltimore, is 72 feet, 2 feet longer than the Jupiter-C, although only one-third as heavy.

VANGUARD TAKEOFF.—The Vanguard satellite launcher takes off from Cape Canaveral.

DID YOU KNOW?



VANGUARD I.—This is a cutaway drawing of Vanguard I, the 6.4-inch test satellite placed in orbit by the United States Navy from Cape Canaveral, Florida. Weighing only 3½ pounds, the test sphere is carrying two radios, one powered by solar cells designed to draw their energy from the sun and the other by conventional batteries. The sun-powered radio, operating on 108.03 megacycles at about 5 milliwatts, is sending back information on the temperature of the satellite's aluminium skin. The other is broadcasting internal temperatures on 108 megacycles at 10 milliwatts. The third stage of the Vanguard rocket, measuring five feet in length and 18 inches in diameter, is also orbiting behind the test sphere. The First United States satellite, Explorer I, measures 80 inches in length and six inches in diameter, including the instrument package and final stage rocket which are orbiting together. The numbers on the drawing identify the following parts of the rocket:

1. Battery powered transmitter
2. Antennas
3. Batteries
4. Solar powered transmitter
5. Solar cells

In Lighter Vein

ON COOKS

BY

SOUMYA

Not a few of us would have had some experience or the other with a cook—though perhaps not with one as historic as the Duchess's Cook in Alice in Wonderland or as that most delightful and popular of Mr. Wodehouse's creation—the inimitable Jeeves. It would be a gross insult to the immortal Jeeves to refer to him as a cook—he was, as he termed himself, a gentleman's personal gentleman. But he also happened to be a cook par excellence. He materialised out of nowhere like a genii with a plate of bacon and eggs the moment his master opened his eyes. And when the master was suffering from a hangover after attending a New Year's Eve Party, he knew just the concoction—his own patent—which would put one alright and buck one up. He was simply marvellous, bulging forehead and all, when it came to a question of extricating Bertie Wooster from the most embarrassing predicaments. But he had fastidious tactics—he strongly disapproved of Bertie's mauve silk pyjamas! While the Duchess's cook went about sprinkling pepper and sneezing.....There was another gem of a cook in Wodehousian lore—a Frenchman in the service of Bertie's Aunt Dahlia, who surpassed everyone in his profession, but who was so temperamental that one word from any old person was sufficient to upset him and make him weep copious tears into his broth like an inconsolable Niobe; and make him give his notice of quitting service immediately. King Alfred of England was no good cook, we hear. The story comes down that when he once prepared cakes, he burnt them.

Fiction and history aside, one encounters such a variety of cooks in real life—of as different temperament, calibre and proficiency

as the variegated nature of the human species affords scope for. I have had occasion to come across quite a few of them myself.

The cooks in my grandfather's house used to be high-frequency ones—they used to change frequently, at least once a month, if not earlier. They were as fickle as the wind-vane, and about as temperamental as a Hollywood actress. And then there were my great aunts.

It would only be fair to explain what I mean by that last sentence. My great aunts—both septuagenarians belong to that fast disappearing class of orthodoxy which would perhaps be as extinct in a few decades hence as the dinosaur. They would not eat "Western" vegetables—even common ones like cabbage, potato or tomato. So if any of these was prepared for the rest of the household, the stove had to be sanctified in the orthodox manner and some other item had to be prepared separately for them. Everytime the cook touched such unholy things as potatoes, he had to wash his hands before touching the vessels in the kitchen. So in the course of serving a meal, this entailed the cook's washing his hands a dozen times—and if he forgot, God help him! My great aunts do not take coffee. The coffee filter, kettle, and everything that goes with it, had to be kept in a separate room and were not permitted in the kitchen. Tap water was taboo—my great aunts still get up at 4 o'clock in the morning and assiduously draw up their requirements from the well. So in spite of there being a tap in the kitchen, the cook had to draw water from the well for all purposes—even for washing the kitchen floor. But the presence of the tap used to exert a hypnotic

effect on the cooks—and it was a temptation few of them could resist. In the afternoons, when they thought my great aunts were having a nap, they would surreptitiously draw water from the tap and were sure to find that my great aunts eyes were fixed on them; and that it was they themselves who had been caught napping. My great aunts, normally not of very keen eye-sight, had hawk's eyes when it came to supervising the cook and the kitchen, and would have beaten any vigilance squad at the game. Few cooks were able to endure this sort of thing, and left with every change of month, if not earlier. It became an everlasting cycle of cooks coming in one day and going out another. Pretty soon it became impossible to keep count of them, and the same fellow would be found coming a second time.

The only cook whom my father, uncle, and aunts still remember with affection is now a

venerable old gentleman in his eighties. He served my grandfather for years when my father was a child, and left only when my grandfather was transferred. He knows the whole family history; still manages to come for all weddings in the family, to keep an eye on the kitchen, and is known as "Qi Thatha" by one and all. Except for this one person, no other cook saw the end of a year in my grandfather's service.

Among the many was one—a veritable incarnation of the "Hail-fellow-well-met" type. A visitor had only to come to see my grandfather, and, whatever work he was doing, he would leave it and stand at the doorstep, talking away profusely and glibly for all he was worth, instead of letting the visitor go in to my grandfather's room. It was no use sending him in for coffee—he would put water to boil, and the next moment would

be standing at the doorway of my grandfather's room, with his ears all stretched out, to catch any conversation that might be going on. It just shows that it is not simply little pitchers that have long ears! The rest of the time this cook spent in galloping around the house, carrying my cousins piggy-back, and knocking down things that dared to stand in his way—much to the consternation of my great aunt. On one occasion he almost fell down the staircase, with one of my cousins on top of him. It was a hilarious and exciting life at my grandfather's during the period of his sojourn then—and you could easily distinguish my grandfather's place from the screams of pain or laughter coming from it. And that cook was an able talker—he could persuade my great aunt that it was well water he was using when it was actually tap water. My great aunt, when they had thought they had caught the cook redhanded, would come out of the kitchen, muttering to themselves that they were sure they had seen the cook at the tap.

There was one cook in my father's service, whom we have all occasion to remember. His *modus operandi* was, preparing everything at the eleventh hour. He would roam about all over the City on a bike all day long, and only an hour before our dinner time would put in an appearance. He was no doubt quick when it came to cooking, and would have our food ready in a very short time. But we could never be sure whether he was coming back after each of his outing. On one memorable day, when our most favourite dishes were prepared, we were all waiting eagerly at the table. The cook, with his usual hurry, was serving. He was bringing in 'rasam', and since it was boiling hot, had balanced it on a roll of cloth. Before we knew what had happened, he had upset the whole lot on my sister's back. After that day, the Doctor was a regular visitor at our house for a whole month, before my sister got a little well,

and she still bears the scar on her back. And ever since that day, whenever our favourite dishes were prepared, it was with apprehension that we waited for them.

There are honest cooks and dishonest ones. One of the cooks in my grandfather's house decamped with all the money in my great aunt's trunk, while another one bought a long list of provisions of my grandfather's credit from the local grocer's before he disappeared. My grandfather found this out 3 months later when he was presented with a stunning bill by the grocer, who had waited that long for his money. Another one pinched an expensive shawl, and when the servant suspected it and went to search his room, tied it round his tummy, and wore his dhoti on top of it. The extra few inches at his waist gave him away. There was one who diligently read newspapers and magazine, and if we could not find any book, it was to be found in his room. I had one cook (female—the dictionary does not admit the word cookess) who was so superstitious and afraid of ghosts that she could not sleep without a night light. The one I have now has poor eyesight—he would stand, peering near the stove—apparently unconcerned, while the milk goes on boiling over into the fire. His spectacle always reminds me of Nero fiddling away while Rome burnt.

There are cooks whose cooking is positively poisonous—they cannot prepare anything without spoiling it. But there are some good cooks too—and so they are all tolerated as

"Owen Meredith" says:

"We may live without poetry, music and art,

We may live without conscience, and live without heart,

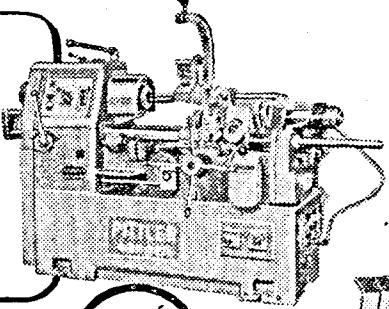
We may live without friends, we may live without books,

But civilized man cannot live without cooks."

REDUCE YOUR COSTS
by using

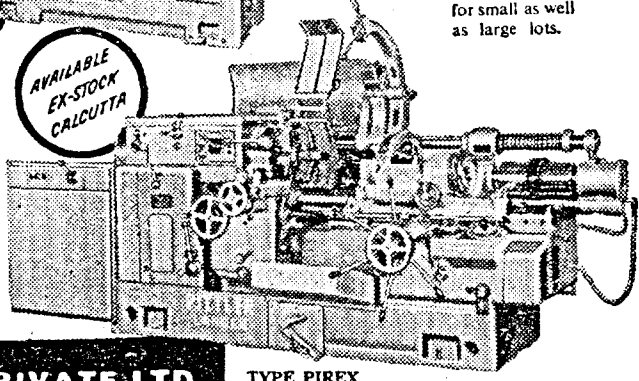
PITTLER

**DRUM TYPE TURRET
SEMI-AUTOMATICS**



TYPE PIROFA
For economic production of workpieces in brass, light alloys, etc. for the optical, fine-mechanical and fittings industries and for railway components, also for light stock removal on cast iron and steel parts. Highly suitable for small as well as large lots.

PITTLER Drum-type Turret Semi-Automatics are suitable for work requiring high accuracy, better surface finish, high rate of production and simple operation, and for heavy material removal. Drum-type turret with 12 or 16 toolholes, equipped with standard tools suitable for all general purpose work.



TYPE PIREX
For heavy duty machining on all types of material, also in small and large lots.

AVAILABLE
EX-STOCK
CALCUTTA

SOLE DISTRIBUTORS:

FRANCIS KLEIN & CO., PRIVATE LTD.
1, INDIA EXCHANGE PLACE, CALCUTTA-1
SHOWROOMS: 13A, GOVT. PLACE EAST

Resident Engineer in South India:

I. S. SOMASHEKAR, 10, Prithvi Avenue, St. Mary's Road, Madras 18

Brain teasers

1. Two steamers 'BINAPANI' and 'BINAKOYLA' set out from port 'A' for 'B', x miles away. After reaching 'B' they stay there for 4 days and return to 'A'. 'BINAPANI' does 30 knots while going and 40 knots while returning and 'BINAKOYLA' does 35 knots both ways. Which steamer gets back first?

2. When Uncle Murphy set out for a tour overseas the ship's agent put in a condition that no baggage having a length greater than 4 feet would be permitted to be taken in the cabin. Uncle Murphy could not leave his favourite tackle which unfortunately was six feet long. After a good thought Uncle Murphy managed to take it in his cabin. How did he manage?

3. Kishi and Ramani, the two great bowlers of our team, as expected shared the bowling honours for the season and just before the last match had bagged between them, a total of 76 wickets. Their respective averages were 8 and 10 runs per wicket. The last match in which Kishi took 3 wickets for 69 runs and Ramani took 2 wickets for 16 runs ended in a draw and surprisingly for both bowlers also, the season ended with the same average of 9 runs per wicket.

What was the share of wickets by the bowlers before the last match?

4. At the party given in honour of Shrimathi and Shri Mullmull Kurtabhai, in addition to the host and hostess, Shrimathi and Shri Dhotarmull there were three other friends who had come to party with their wives. The friends were Sarvashri Patloon Singh, Lungiwalla, Katcha Ram. They sat at the dinner table in such a way that no husband sat next

to his wife and three of the ladies sat between two men. Shri Dhotarmull sat next but one to Shrimathi Mullmull Kurtabhai. Shrimathi Katcha Ram sat next to her sister. Shri Lungiwalla sat between two ladies and so did Shri Patloon Singh. Shri Katcha Ram took his seat next but one to Shri Mullmull while the latter sat on the left of his father-in-law. There were two occupants between Shrimathi Katcha Ram and Shrimathi Patloon Singh.

What is the clockwise arrangement starting from Shri Dhotarmull in the party?

5. Two cyclists Bansi and Murali drive along the same direction. Bansi riding at 10 Kilometres per hour, started 13 Kilometres ahead of Murali, who rode at 15 Kilometres per hour. The dog of Murali as they started set off after Bansi at 20 Kilometres per hour. As soon as it reached Bansi, the dog turned back at once to its master. It continued to run back and forth until Murali overtook Bansi. How far did the dog travel?

6. Shanti said to Meenaxi, "I am twice the age that you were when I was your age. When you get to be my age our ages will total 45 years." What are their respective ages?

Solutions to last month's teasers

1. The total bill without deduction was Rs. 2.70.
2. The dog can pass under the wire with his master's motor lorry as the clearance will be approximately five metres.
3. 10 problems.
4. $125 \times 37 = 4,625$.
Hence A—1, B—2, C—5, D—3, E—7, F—8, G—6 and H—4.
5. 210, 526, 315, 789, 473, 684 is the smallest solution.
6. Young Farmer.

Wit and Whistle

It was the rarest of things that the Works Manager was talking to the workers during one of his rounds in the workshop. One of the new recruits complained that he had no shovel whereas his other colleagues had. "Oh! That does not matter" said the Works Manager. "It is our responsibility to give you work and supply the tools. You have got your pay isn't it?"

"Of course, yes, Sir," said the recruit. "But others have got something to lean on whereas I don't have any."

2. The good old patient, standing at the corner of the compounding room asked the compounder, "I want something which stirs me up; which makes me feel like jumping and running. Has the doctor added anything like that in the prescription?"

"No" was the indifferent answer from the compounder, "but you will find that in the bill."

3. The new comer was worried about the climatic conditions of the village. So he asked one of the oldest inhabitants, "How do you find this place? Healthy?" The old man answered, "Take my own case. When I first came here, I had no hairs on my head. I could never walk. I was even unable to talk. Now I am alright and I can do everything."

"That's fine" said the visitor, "How long since you are here?"

"I was born here" was the reply.

4. Giving his final instructions to the Paratrooper Trainee, the Sergeant said, "After

you jump from the plane immediately you start counting. When you count Ten press the first button. If it does not open count another Ten and press the second button. On landing you will find a truck waiting for you to take you to the camp."

So the trainee after jumping from the plane counted Ten and pressed the first one. Finding that the parachute did not open he counted another Ten and pressed the second one. Unfortunately even then it did not open. Then he murmured within himself, "And now I am sure that the truck also will not be there."

5. The hostess told her 8 year old son, "Look, I am inviting Mr. Harrison for dinner to-day. You be a good boy and don't talk or comment on his nose." That was enough.

The boy's eyes were staring only at the guest's nose which was evidently damaged during war. Finally came the verdict from the boy, "Why Mum, you did not want me to talk of his nose. But he hasn't any at all".

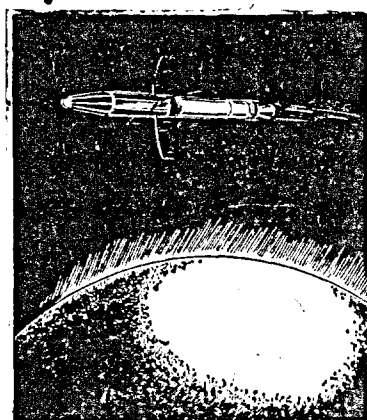
6. The Sheriff, on arriving at his office found a large number of people waiting for him. As he passed by the crowd with his friend, he cracked a joke and went in. Inside his office, his friend told him, "That is one of the stalest jokes I have heard and I doubt very much if it could create any laughter at all."

"There is a secret behind it my friend" told the Sheriff. "Please note that all those who have laughed at that joke have come for favours!!"

DID YOU KNOW?



The U. S. Farside rocket, which in 1957 attained an altitude of at least 2,700 miles, the farthest any man-made device has penetrated space, is being considered by U. S. Scientists for a flight to the moon in 1958.



Scientists say, the U. S. earth satellite Explorer has been maintaining an internal temperature of 10 to 30 degrees centigrade (50 to 86 degrees Fahrenheit) well within the range of human comfort, even though outside temperatures vary from 100 below zero to 300 degrees above centigrade (minus 148 to 572 Fahrenheit).

MACHINE TOOLS:

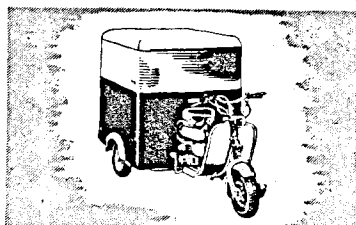
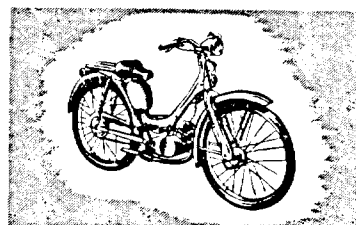
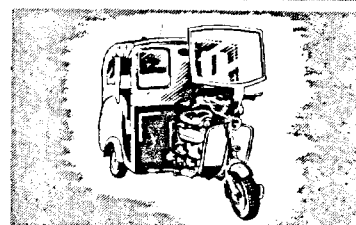
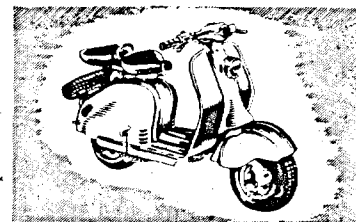
VACU-BLAST (U.K.) Shot Blasting Equipment ★ LUKAS (W. Germany) Re-railing Equipment ★ INDUMA (Italy) Milling Machines ★ BOREL (Switzerland) Electric Furnaces ★ PEGARD (Belgium) Horizontal Boring Machines ★ FOERSTER (W. Germany) non-destructive Testing Instruments ★ PECO (W. Germany) Resistance Welding Machines ★ NORTON (U.S.A.) Grinding Machines.

Enquiries solicited by:

Hindustan Export & Import Corporation Private Ltd.

POST BAG 1091, ANAND BHAVAN, HORNBY ROAD, BOMBAY 1

Tele : 25 38 85/6



That's why SHELL has specially developed the new Shell 2T Two Stroke Oil—a new-comer to the Shell X-100 range of automotive lubricants. Shell 2T Two Stroke Oil is a blend of high grade mineral oils containing additives to reduce engine wear and spark plug fouling. It also has a special diluent which ensures ready mixing with the petrol—no pre-mixing is necessary. For every gallon of petrol you need only one-twentyfourth of a gallon of Shell 2T Two Stroke Oil to get maximum performance from your two stroke engine.

Here's what it does!
Shell 2T Two Stroke Oil—
a Shell X-100 Grade
—mixes easily with petrol, reduces
deposits on pistons,
combustion chambers and exhaust
ports. Shell 2T Two Stroke
Oil protects your engine against
piston seizure, corrosion
and spark plug fouling.



GOOD NEWS

for all two stroke engine owners!

**A Shell X-100 Grade
Specially Designed
for Two Stroke Engines!**

More and more people are now using light vehicles powered by two stroke engines. Motor scooters, scooter delivery vans, light motor cycles and even cycle rickshaws—they all need a special lubricating oil because operating temperatures in a two stroke engine are much higher than in ordinary four stroke engines!

RAILCOACH

Published by the Integral Coach Factory
ISSUED ON THE 15th OF EVERY MONTH

Devoted to all Railway problems, Technical Matters
and other problems of General Interest

Rates for Advertising

Per insertion		By the side of Contents —	
ORDINARY—		Half page	Rs. 70
Full page	Rs. 100	Facing contents —	
Half page	Rs. 55	(i) Full page	Rs. 125
Quarter page	Rs. 30	(ii) Half page	Rs. 70
COVER —	(Not available)		
Front	Rs. 250		
Back	Rs. 200		
Inside Front	Rs. 200		
Inside Back	Rs. 200		
SPECIAL POSITIONS—			
Facing			
(i) Front inner cover	Rs. 150		
(ii) Back inner cover	Rs. 125		
Facing Editorial—			
(i) Full page	Rs. 125		
(ii) Half page	Rs. 70		

Mechanical Data

Blocks	Screen 100
Full page	8" x 5 1/2"
Half page	4" x 5 1/2"
Quarter page	4" x 2 1/2"
Cover page	Art paper one colour
Inside page	Imitation art paper

CIRCULATION

The "Railcoach" circulates among Officers and staff of the Integral Coach Factory, General Managers and other important Officers of all Railways in the country, the Union Minister for Railways and Transport, the Union Deputy Minister for Railways and Transport, the Chairman and Members of the Railway Board etc.

TERMS

1. Blocks or lay-outs are to be supplied by the Advertiser or will be charged for extra.
2. Advertisement materials to reach the Editor before the 1st of every month for the month's issue.
3. Cheques should be drawn in favour of the Editor, "Railcoach", Integral Coach Factory, Perambur, Madras 23.
4. Texts of advertisements are subject to approval by the management.
5. A 5% rebate is allowed for 12 consecutive insertions.

Further particulars from

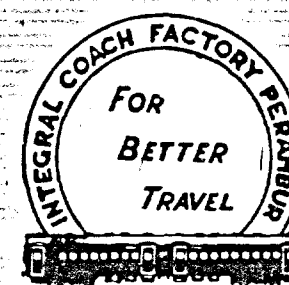
The Editor

RAILCOACH

Integral Coach Factory, Perambur, Madras 23

Edited and Published by K. Santhanam, Principal, Technical Training School, Integral Coach Factory, Madras 23 and Printed by M. G. Daniel, at Thompson & Co. Private Ltd (Minerva Press) Madras 1

RAILCOACH



VOL. III, No. 2

NOVEMBER 1958



A view of the I. C. F. Institute where of late a number of cultural activities have been taking place.

PRICE 25 NAYE PAISE

RAILCOACH

Published by the Integral Coach Factory
ISSUED ON THE 15th OF EVERY MONTH

Devoted to all Railway problems, Technical Matters
and other problems of General Interest

Rates for Advertising

Per insertion

ORDINARY—		By the side of Contents —	
Full page	... Rs. 100	Half page	... Rs. 70
Half page	... " 55	Facing contents —	
Quarter page	... " 30	(i) Full page	... Rs. 125
COVER —		(ii) Half page	... " 70
Front	(Not available)	Mechanical Data	
Back	... Rs. 250	Blocks	... Screen 100
Inside Front	... " 200	Full page	... 8" x 5½"
Inside Back	... " 200	Half page	... 4" x 5½"
SPECIAL POSITIONS—		Quarter page	... 4" x 2½"
Facing		Cover page	... Art paper one colour
(i) Front inner cover	... Rs. 150	Inside page	... Imitation art paper
(ii) Back inner cover	... " 125		
Facing Editorial—			
(i) Full page	... Rs. 125		
(ii) Half page	... " 70		

CIRCULATION

The "Railcoach" circulates among Officers and staff of the Integral Coach Factory, General Managers and other important Officers of all Railways in the country, the Union Minister for Railways and Transport, the Union Deputy Minister for Railways and Transport, the Chairman and Members of the Railway Board etc.

TERMS

1. Blocks or lay-outs are to be supplied by the Advertiser or will be charged for extra.
2. Advertisement materials to reach the Editor before the 1st of every month for the month's issue.
3. Cheques should be drawn in favour of the Editor, "Railcoach", Integral Coach Factory, Perambur, Madras 23.
4. Texts of advertisements are subject to approval by the management.
5. A 5% rebate is allowed for 12 consecutive insertions.

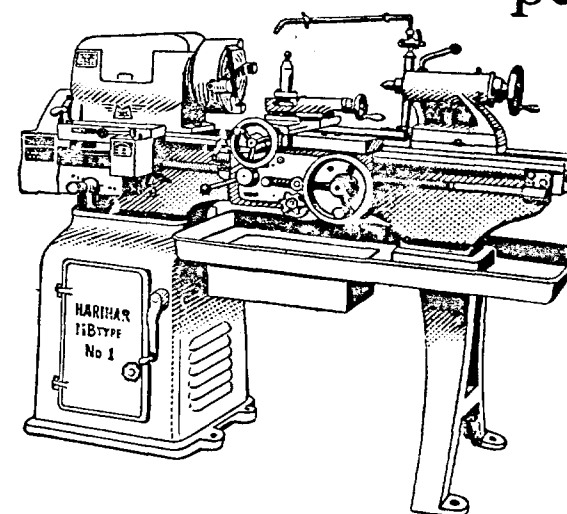
Further particulars from

The Editor

RAILCOACH

Integral Coach Factory, Perambur, Madras 23

a
compact
lathe
with
commendable
performance



Very popular amongst the light industries, this Lathe, HARIHAR MB Type 1, is ideal for training technicians as it incorporates all the latest improvements made in the manufacture of this type of machine tools. Now manufactured on assembly lines, this lathe as any other machine tool is thoroughly inspected and **FIRST GRADED** by I.W. of the Government of India. Illustrated literature giving full details of this lathe sent on request

Manufacturers

THE MYSORE KIRLOSKAR LIMITED

YANTRAPUR POST OFFICE, HARIHAR.

Sole Agents:

BATLIBOI (PRIVATE) LTD.,
Silver Jubilee Park Road, Bangalore 2.

CHANDA PAINTS

FOR QUALITY & ECONOMY
FOR BETTER COVERAGE

IN WIDE AND VARIED USE THROUGHOUT OUR COUNTRY
BOTH FOR INTERIOR AND EXTERIOR PURPOSES

RENOWNED FOR DURABILITY AND FINISH

"INERTOL" PAINTS

For Iron Concrete, & Steel — the best aseptic water proofing
compound — for use on Piers, Quay Walls, Foundations
Granaries, Locks, Lock Gates, Cranes and etc.

INERTOL PAINTS ARE USED ON EVERY COACH THAT LEAVES THE
INTEGRAL COACH FACTORY

MANUFACTURED BY:

Messrs. P. C. Chanda & Co. Ltd.
CALCUTTA

Represented in the South including
Madras, Mysore, Kerala & Andhra Pradesh

By

The South Indian Export Co. Ltd.

20 General Patters Road, Madras 2

Telegrams : Dieselage Madras

Telephone : 84127

RAILCOACH

(INTEGRAL COACH FACTORY MAGAZINE)

EDITORIAL NOTICE

All contributions must be clearly
typed and doublespaced on one side of
the paper only, and signed, not necessarily
for publication, but as a guarantee of
good faith.

Manuscripts and photographs, not
accepted for publication, will not be
returned unless the sender so requires.
Intending contributors from outside our
Factory, if they intend to get back un-
accepted articles and photos, should send
a suitably stamped and self-addressed
envelope along with the material sent
by them.

Contributions should be addressed to
the Editor, not by name, and reach him
not later than the 25th of every month
for consideration for publication in the
next month's issue.

The Editor does not assume any
responsibility for the accuracy of the news
supplied by correspondents or for opinions
expressed by contributors. Opinions
expressed in the "RAILCOACH" whether
editorially or by contributors should be
regarded as having no official authority.

Annual Subscription Rs. nP.
... 3 00

CONTENTS

NOVEMBER 1958

	PAGE
Editorial	5
News and Notes	6
The Indian Railways and World Bank Assistance	8
Australian Rail Cars for Indian Railways	10
Railways at 'India 1958' Exhibition	11
Are Doctors and Medicines Necessary?	14
Visitors to the Factory	15
Taj Mahal	16
News from Switzerland	18
Lost and Found	20
The Industrial Engineer in Transition	22
March of Science	29
Dawn at Tiruchendur	31
They Cashed their Ideas	32
Institute Celebrates Gandhi Jayanthi	33
Wit and Whistle	34
Brain Teasers	35
News Makers	36
Obituary	36

PHONE : 71756

GRAM : "SAFEDEAL"

for Supply of
Hard Boards, Timber, Glasses,
Mirrors, Furnitures and
any other materials



Contact

MANASUBA & CO. (PRIVATE) LTD.

82 ROYAPETTAH HIGH ROAD

MYLAPORE

MADRAS 4

editorial

FOURTH PRODUCTION YEAR

It will be recalled that the originally scheduled outturn of 350 shells per year was increased to 400. As per the increased target a total of 33 shells has to be turned out each month and it can be said that the knocked down shells that were available so far were to a certain extent helpful in maintaining the outturn. With the turning out of all the knocked down shells, by the end of September '58, the increased outturn of 33 shells for the month of October had to be all-indigenous shells. It is gratifying to note that a successful beginning of the Fourth Production Year has been made by turning out 33 indigenous shells in October. This achievement conclusively proves that the staff of the factory are alive to the transportation needs of the nation and are willing to put forth their best and thus to rise to the occasion.

If the prosperity of the nation is to increase, it can materialise only if each one of us not only discharges his allotted responsibilities but also willingly takes on additional responsibilities as circumstances warrant. That such a willingness prevails amongst the staff has been adequately proved by the numerous additional commitments that have been taken on and being successfully implemented by the factory. To name one such additional responsibility is the manufacture of TLR shells. It is heartening to record that the prototype of the TLR shell has been completed and the bulk manufacture has been initiated.

Monthly Outturn

		Target figures		Actual figures	
		K.D. coaches	Indigenous coaches	K.D. coaches	Indigenous coaches
October, 1958	...	...	28	...	33
Cumulative total for the first seven months of the year 1958-1959		...	...	...	...
		30	140	36	176

NEWS AND NOTES

Railway employees' need

In view of the need for paying increasing attention to work relating to welfare of railway employees and having regard to the growing volume and complexity of establishment work on the railways, the Railway Board has decided that the existing post of Deputy General Manager (Personnel) on each railway should be re-designed as Chief Personnel Officer, and that the railway personnel organisations should be strengthened by the appointment of Deputy Chief Personnel Officers.

The object is to ensure that the Chief Personnel Officers on various railways are relieved of routine establishment work for undertaking more important duties in connection with the welfare of staff and better liaison with railway labour unions.

The Railway Board has directed that either the Chief Personnel Officer or the Deputy Chief Personnel Officer should undertake a considerable amount of effective local inspections, in order to ensure that due attention is paid to staff welfare and establishment work in the divisions and districts and at even lower levels on the Indian railway system.

The Railway Board has announced the appointment of seven senior officers as Deputy Chief Personnel Officers on different zonal railways, as part of the move to strengthen the personnel organisation.

Increased use of Welded Rails

The Estimates Committee in its 27th report presented to the Lok Sabha in September 1958 said that it was not satisfied with the progress made in the welding of rails on the Indian railways since 1947 and has reiterated its recommendation that the individual railways should be asked to chalk out definite annual programmes so that the practice of using welded

rails may be extended rapidly on Indian railways.

The Committee had pointed out in their earlier report that no progress had been made in regard to the welding of rails and had recommended the adoption of welded rails on a sufficiently large scale.

In reply to a query made by the Committee in its earlier report, Government stated that the total requirements of steel track materials of the railways during the Second Five-Year Plan amounted to some 24 lakh tons consisting of rail, fish-plates, steel sleepers etc. Indigenous production of these materials at present was only about one lakh tons per year and nearly 70 per cent of the requirements had to be imported.

The Committee had earlier suggested that the setting up of a steel foundry at Chittaranjan should be expedited and also that the feasibility of setting up a few more steel foundries at suitable places should be carefully examined.

The Government, in reply, stated that the setting up of a steel foundry at Chittaranjan was under progress. Global tenders in this connection were called and 15 tenders had so far been received. The same are under scrutiny of the Board and were likely to be finalised shortly.

Aid for Indian Railways by World Bank

The Annual Report of the World Bank says that four loans of the total amount of 90 million dollars were made to assist in financing a five-year programme to modernise and develop the Indian railways which was "by far the most important form of transport in India." The Bank's loans will be used for the purchase abroad of 500 locomotives 10,000 freight cars, rails and other materials and equipment.

The annual report states that in the year ended June 30, 1958, it had set new records in both its lending and its borrowing operations.

The growing number of economic development projects that are ready and eligible for financing by the Bank, says the Report, "indicates that the rise in lending during the year may have signalled the start of a new and higher level of operations."

The Bank continued to cover out of its own resources all its operating expenses, and continued to show a surplus of earnings over expenditures. Net income during the year amounted to \$ 42 million, the highest figure yet recorded. The Bank's reserves reached a figure of \$ 350 million.

To make possible the expansion of its lending activities, the Bank borrowed larger sums from the capital market than in any earlier year. Net borrowing of \$ 625 million raised the Bank's funded debt to \$ 1,658 million. More than half the new funds came from public issues of long-term bonds in the United States; the year's three issues totalled \$ 375 million. The remaining \$ 250 million was raised by private placements of short-term United States dollar bonds with the Deutsche Bundesbank, central bank of the Federal Republic of Germany. Pointing out that a world-wide market exists for the Bank's bonds, the Report notes that at the end of the fiscal year an estimated 47 per cent of the total outstanding debt was held by investors outside the United States.

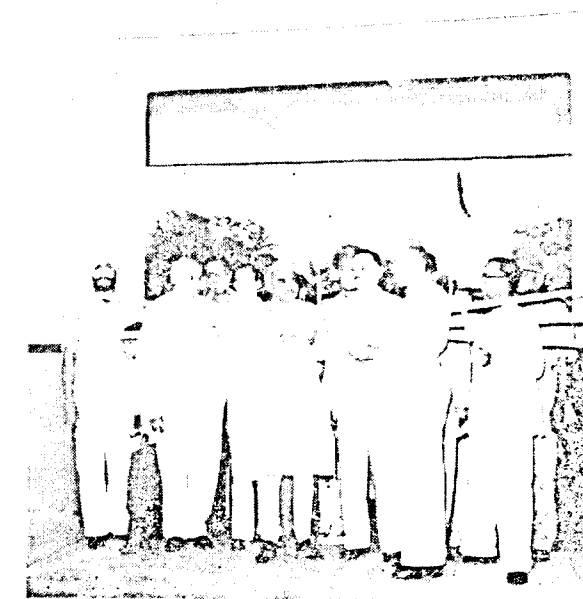
The Bank continued to replenish its resources by sales of parts of its loans. Banks and other institutions agreed to participate in this way at the time of signing of 22 of the year's 24 loans. Approximately \$ 48 million was thus raised. Nearly as large a sum was raised through sales of parts of loans already made.

Funds available for lending were also increased by further releases made by member-countries from the 18 per cent of their capital subscriptions that is payable in their own currency and can only be used with their permission. These releases were equivalent to \$ 149 millions.

Reflecting the higher capital market rates, upon which the charges on Bank loans are based, the interest payable by Bank borrowers rose to 6 per cent in October 1957. With the subsequent easing in rates, the Bank's charges were gradually reduced, reaching 5-3/8 per cent at the end of the fiscal year.

Seven countries joined the Bank in 1957-58—Ghana, Ireland, Malaya, Morocco, Saudi Arabia, the Sudan and Tunisia. This brought membership to 67 and subscribed capital to \$ 9,405 million on June 30, 1958.

The Hon'ble Shri Jagjivan Ram, Railway Minister, declaring open the New Dhanbad Station Building on October 18, 1958



THE INDIAN RAILWAYS AND WORLD BANK ASSISTANCE

BY

P. C. MUKERJEE

Chairman, Railway Board

The First Five-Year Plan was the first co-ordinated attempt made in India at planned economic development of the resources of the country and as this met with considerable success, the Second Five-Year Plan was formulated and is being implemented with much higher targets.

The large-scale expansion of the basic and heavy industries, as included in the Plan, has a substantial effect on the traffic load on the railways. According to the latest estimates, the railways are expected to be called upon to carry 168 million tons annually by 1960-61, as compared to only 114 million tons carried annually by 1955-56. In other words, the increase in freight carrying capacity would have to be of the order of 47 per cent.

In addition, a provision for an increase of 3 per cent per annum in passenger train services has been made. Much of this increase, however, would be absorbed in the normal increase in population that would take place during the five years and as far as can be seen, there is not going to be any improvement in overcrowding.

Apart from an increase of 47 per cent in freight traffic and 15 per cent in passenger traffic, the railways have also to provide for rehabilitation of their assets, and for certain ancillary items which in a complex undertaking like the railways, have to be taken note of, so as to achieve integrated planning. In terms of physical targets the railway plan provides for 842 miles of new lines, 1,607 miles of doubling of track, 826 miles of electric traction—since raised to 1,442 miles, 8,000 miles



Shri P. C. Mukerjee, Chairman, Railway Board

of track renewals, 2,364 locomotives, 11,575 carriages and 107,247 wagons.

The achievement of these physical targets and acquisition of so much equipment is obviously not possible from indigenous resources alone. At the commencement of the Second Five-Year Plan, indigenous capacity for most of the items of railway equipment fell much below the requirements and there were certain important items for which indigenous capacity did not exist at all. It was inevitable, therefore, that the foreign exchange component

of the railway Plan of Rs. 1,125 crores should come to so high a figure as Rs. 425 crores. This, in turn, meant a heavy drain on the slender foreign exchange resources of the country.

The railways have been making a sustained drive for creating and developing indigenous capacity and the value of stores and equipment purchased indigenously has risen from Rs. 68 crores in 1951-52 to Rs. 126 crores in 1956-57. The imports have continued to be at a high rate, in spite of a substantial increase in supplies from indigenous sources, because of the size of the railway programme. The imports pertain, however, only to items which are either not being manufactured in the country or for which indigenous capacity is fully booked.

Loans from I.B.R.D.

The first loan to the Indian Railways from the International Bank for Reconstruction and Development was made in 1949, when a sum of \$32 million was made available for the purchase of locomotives. The question of a World Bank loan for the Second Five-Year Plan was mooted early in 1956, followed by technical discussions between a team of senior railway officers and representatives of the Bank who came to India for an on-the-spot study. This was followed by final negotiations, resulting in the grant of a loan of \$90 million to the Indian Railways in July, 1957.

This loan of \$90 million covers essential equipment for the railway development pro-

gramme including such items as track materials, locomotives (electric, diesel and a few steam), wagons, electric multiple coaches, etc. The equipment has been supplied from Austria, Belgium, Germany, Italy, Japan, United States, U.K. and Yugoslavia.

The railways have had to enter into heavy commitments for a further phase of their development in connection with their electrification schemes, acquisition of rolling stock and track materials. The World Bank has therefore sanctioned a further loan for \$85 million to cover payments upto March, 1959. The World Bank has a very detailed procedure which it follows in the preliminary examination and negotiations for a loan, and later in regard to its disbursement. In all respects, the approach of the Bank officials, who are drawn from different countries of the world, has been extremely businesslike and helpful.

Even in the case of equipment not available in India, the procedure observed by the Indian Railways has always been to go in for global tenders and on the basis of this accept the most economical offer. This has helped the Indian Railways to comply with the Bank's requirements and so obtain the funds.

We are, indeed, very grateful to the World Bank for its assistance, in covering a fair proportion of our foreign exchange requirements. It is very good news that the annual Fund Bank Conference is being held in New Delhi this year. As railwaymen we hope that the busy delegates would find some time to see something of our vast railway system.

AUSTRALIAN RAIL CARS FOR INDIAN RAILWAYS

A gift of six diesel rail cars from Australia were ceremonially presented to the Railway Minister, Shri Jagjivan Ram, by the Rt. Hon'ble Sir Arthur Fadden, Treasurer of the Commonwealth of Australia, at a function at the ceremonial platform of the New Delhi railway station on Wednesday, October 8, 1958.

Presenting the Rail Cars on behalf of the people and Government of Australia, Sir Arthur Fadden said: "I am most grateful and would say that we in Australia regard it as our very great privilege to be associated, even in this relatively small way, in the magnificent and historical effort your country is making to bring a higher standard of living and well-based hopes for the future to your people. Your series of Five-Year Plans represent the greatest economic development Programme undertaken to-date by a democratic country. To be permitted to share in this peaceful revolution is an honour.....About one-third of Australia's effort in the Colombo Plan has been in India and the Indian Railways have received over Rs. 4 crores, which is almost half of the total.....I might add that we are glad in this particular matter to be associated with the Indian Railways with their long and striking history of service to the people as a whole, to industry and to agriculture. By any test it is a great railway system and its directors, managers, operating and other staff, literally numbering over a million, deserve the thanks and the congratulations of India and India's friends, both in past achievements and expanding services."

The gift is part of 24 Broad Gauge diesel rail cars and 2,000 Metre Gauge covered wagons which Australia has agreed to present to the Indian Railways as part of the Colombo Plan Aid Programme.

Accepting the gift, Shri Jagjivan Ram said: "This may appear to be a small matter, but the real significance of the occasion extends far beyond the physical scope of this gift. The occasion is symbolic of the spirit which lies behind this gift—the spirit which has been responsible for the establishment of the Colombo Plan Organisation. The same spirit has permeated the successful working of the organization and has moved many friendly nations to come forward with offers of assistance in developing the economies of less fortunate sister countries of the Commonwealth.....I wish this spirit may gather momentum so that the world instead of dividing into something like camps of contending countries may develop as an agency for mutual aid and collaboration in the fruition of the lofty ideal of eradicating poverty and significant inequalities from our midst. There is enough in the world to go round, but the haves and have-nots must devise rational methods to share the fruits to the mutual good so that the cause of discontent and strife may be eliminated and the world may be welded into a society of nations devoted to a common purpose—the well-being and betterment of humanity in general." The Railway Minister stated that the wagons from Australia were received in India between August last year and August this year, at Madras. "They are being erected there and released for service. Many of them are already on the line and the remainder will soon be placed in service on the Southern and Central Railways."

The rail cars were designed and manufactured in Australia. It is an all-steel construction, designed for safety with a seating capacity of 82 class III passengers.

RAILWAYS AT "INDIA 1958" EXHIBITION

The Indian Railways are one of the largest exhibitors at the "India 1958" Exhibition, with a large covered hall, a full-fledged platform with a locomotive, coaches and wagons flanking either side of it, and a cafeteria called "Rail Snacks."

The exhibits offer a bird's eye-view of the all-round progress made by the railways in recent years, and the vast development programme they now have in hand.

The stall is packed with interesting still and live models and the first floor is devoted to a three-dimensional display of the targets and achievements of the Indian railways under the first and second Five-Year Plans, and other allied matters.

The three main themes of the Railway stall are: march towards self-sufficiency in railway equipment; some of the railways' engineering achievements, past and present; and technical and operational improvements introduced to raise operational efficiency. The models provide a glimpse into the extremely complex and varied nature of the working of the railways.

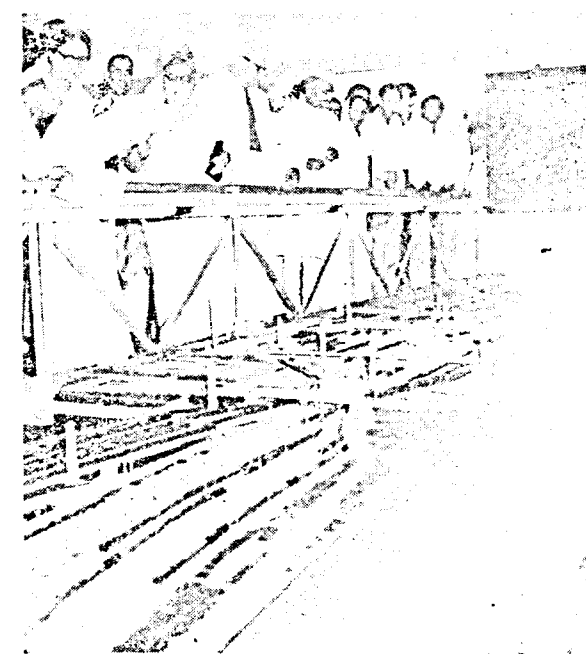
There is a multi-coloured map of India showing the various industries in the country served by the railways.

Among the models on the left are those of an air-conditioned coach and the end walls of an integral coach. The latter emphasizes the anti-telescopic character of end walls of an integral coach, which ensure comparative safety of passengers in the event of an accident.

Twelve of the 24 rail cars are already operating on the Southern Railway. The second lot of 12 cars has been allotted to the Northern Railway.

There is a giant size globe representing the earth which compels attention. A train circles this globe at equator. The model bears the arresting slogan, "We girdle the Globe 25 Times Daily," representing the distances which trains in India cover every day, 562,000 miles every 24 hours. The visitor also learns that the railways run 7,000 trains daily (4,400 passengers and 2,900 goods), and that these serve over 6,400 railway stations all over the country. (During the year ending March 1958, railway passengers in India undertook journeys aggregating 120,000,000 miles daily—the equivalent of about 4,800 trips round the world at equator or 250 return journeys to the moon and back).

The Railway Minister inspecting the Railway Stall in the 'India 1958' Exhibition. Picture shows a still model of the Moghalsarai Yard



There are models of scientific instruments that the Railway Research Centre at Lucknow has built as part of the drive to achieve self-sufficiency in scientific instruments. They "speak" eloquently of the good work being done at this centre. Among the models are those of weigh-bars, three-component accelerometers, bituminous emulsion etc. The Lucknow Centre has contributed a number of other exhibits pertaining to the role of research on the Indian railways.

Panels in a balcony offer a striking visual illustration of the remarkable progress which the Indian railways have made in post-independence years, and the vast development work they have in hand in connection with the Second Five-Year Plan.

The panels tell a number of stories about the railways. For example, the very first panel informs the visitor that the Indian railway

system is the largest in Asia and the fourth largest in the world. It is India's biggest nationalised undertaking, employing 1.1 million persons at an annual cost of Rs. 1,550 millions. Daily, they carry 3.8 million passengers—about twice the population of Delhi State.

On the balcony one finds targets and achievements of the railways in various spheres, depicted through panels which bear brief but eloquent slogans. This three-dimensional display in connection with the two Plans "picturises" what otherwise would have been mere dull statistics and makes them easily "digestible" for laymen.

Some other panels relate to the Rs. 1,125 crore Plan of the railways, their purchase programme, the new lines to be constructed, the programmes of bridge building, electrification and construction of new railway stations, procurement of rolling stock and workers' welfare etc. under the Second Plan. Other panels provide an insight into the rapid increase in the production of locomotives, coaches and wagons in India.

Another section of the panels gives a break-up of Rs. 1,125 crores to be spent under the second Railway Plan on items like rolling stock, machinery and plant, track renewals, bridge works, traffic facilities etc.

The most interesting panels, probably, are those which belong to the section "Railways in National Life."

Through a series of cleverly executed panels, the impact of the railways on the life of the individual as well as the nation is forcefully brought out.

An interesting exhibit on the first floor is a map, electrically operated, showing the route mileage electrified so far and the routes which are going to be electrified in the country during the Second Plan period.

There is a big map of India electrically operated showing in stages the progress of route mileage of the railways since 1853.

As he stands on the platform, the visitor can see an air-conditioned chair car on the left with reclining chairs which offer great comfort to Class III passengers. Similarly, one can see on both sides of the platform a coach produced by the Integral Coach Factory at Perambur, near Madras, a Class III coach manufactured by M/s. Hindustan Aircraft Limited, an ordinary air-conditioned coach.

a Class III sleeper coach, a locomotive manufactured at Chittaranjan, wagons made in India etc.

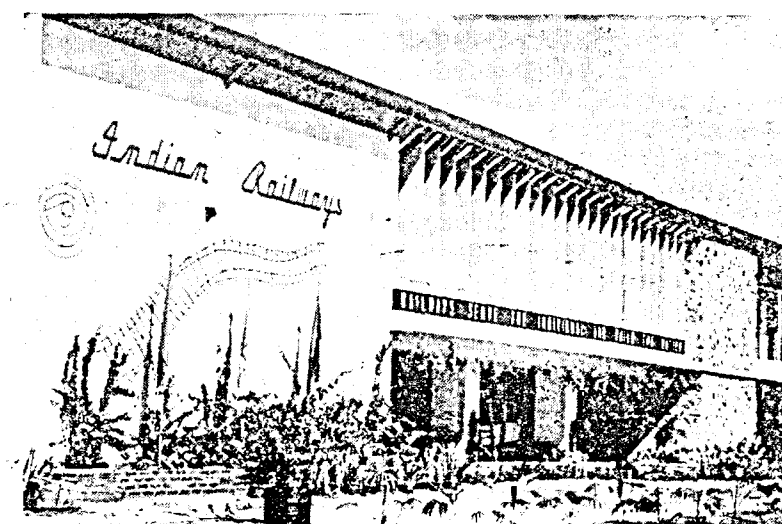
These items of rolling stock mirror the great progress that India has made towards self-sufficiency, as all of them are made in India.

Among the still models the I.C.F. workshop, the Basanti Institute at Chittaranjan, the new Churchgate station at Bombay, an aspect of work at the Ganga Bridge, the Bolpur retiring rooms are worth mentioning.

Giant size Globe at the India 1958 Exhibition. A train circles the globe at the equator and, as will be seen, the model bears the arresting slogan, "We circle the globe 25 times daily".



A frontal view of the Indian Railways Stall in the 'India 1958' Exhibition



ARE DOCTORS AND MEDICINES NECESSARY?

BY

DR. A. RAMDAS

Divisional Medical Officer, Madras

Lay people usually associate health with doctors, bottles of medicines and injections. People with a modernised outlook conjure up pictures of white-coated specialists, big hospitals and complicated mechanical gadgets like X-ray machines. Public bodies and Governments vie with each other in announcing fabulous expenditure on medicines and costly medical equipment. Queues of out-patients waiting in hospitals get longer, making hospital administrators beam with pride about their statistical potentiality. Is all this justified?

The question is a difficult one to answer, if the answer is to satisfy the layman. Modern medicine has made phenomenal contributions to man's health in the field of human welfare. Preventive medicine is fast abolishing from the face of the earth such Captains of Death as Plague, Malaria and Small-pox. Curative medicine has discovered epoch-making drugs like Cortisone. Modern Surgery has advanced its frontiers to such formerly undreamt of territories like the human heart and brain. Still doctors know in their heart of hearts, that these are not the only answer to the vexed problem of ill-health. Like most good things of life, good health need not be purchased at the price we pay.

Primitive man must have enjoyed an enviable amount of good health. He lived in the lap of Nature and so enjoyed of her generous bounty. As population increased, mankind grew up into larger and larger communities. The glitter of the trappings of civilisation attracted man. With this sweet rose came the thorn of ill-health. The over-populated urban

communities of the west at the commencement of the Industrial Revolution, were veritable skittles for that relentless thrower, Death.

It is being gradually realised by enlightened medical thought that it is foolish to create favourable conditions for ill-health and then establish costly institutions for curing it. Hence in the councils of international health bodies like the World Health Organisation (W.H.O.) emphasis has shifted from cure of disease to prevention of ill-health. We have even gone one more step ahead. The concept of prevention of ill-health has yielded place to the concept of achievement of positive health i.e., a surplus of health.

The layman will ask: are we then not to depend any longer on doctors and hospitals? The answer is that one need not depend entirely on them for leading a healthy life. We will still require them. The last word on the conquest of human disease may not perhaps be said for milleniums to come. The human body is a natural prey for a thousand predatory factors. That is the basic pattern of Nature's delicate balance. Human beings like all other living things, will be born and must die. Just as we live on innumerable living beings such as plants and animals, other living beings like bacteria live on us. And many of these bacteria cause disease. The human frame has to wither and fall before the inexorable advance of age. So doctors and medicines will still be required to make full lives fuller. The spirit of human endeavour will not rest on its laurels. The spirit of the Science of Medicine can be no exception to this.

Then why should we talk of getting away from medicines and doctors? The best of medicines presented in the most attractive bottle will still be medicine. A presentable bottle cannot change the taste of castor oil. The most skilful surgeon, working with the best surgical equipment, will still be inflicting a

wound. If it is possible, why should we not minimise suffering and pain? We can do so and enjoy ourselves in the process, thus making the world a happier place for all of us to live in. We shall by and by discuss how this could be done.

Courtesy—Southrailnews

VISITORS TO THE FACTORY

Mr. Martyn J. Webb, Lecturer in Geography of the Oxford University, visited the Factory on the 1st October, 1958.

On the 17th October, 1958, Mr. Samuel C. Waugh, President, Export Import Bank of the United States, visited the Factory. The distinguished visitor was received by Shri K. Swarup, Chief Administrative Officer, and taken round the various workshops of the Factory and the Basic Training Centre of the Technical Training School. He was very much impressed with the working of the factory and, at the conclusion of the visit, conveyed his "congratulations to all responsible for this fine accomplishment."

Mr. E. Schmidt and Mr. H. L. Werner, members of an East German Delegation, visited the Factory on the 18th October, 1958. They were taken round the workshops. They were deeply impressed with what they had seen in the factory and were sure that the pace of progress would increase further in course of time.

Professor N. G. Ranga, Member of Parliament, and Chairman, Public Accounts Committee, visited the Factory on the 21st October, 1958. He was taken round the workshops and the Technical Training School of the factory. At the conclusion of his visit Professor Ranga observed that the experience of the first shift in this factory was so encouraging that the commencement of the second shift at an early date was eagerly being looked forward to. He trusted that the I.C.F. would soon achieve record production at the lowest price with mostly Indian materials.

Shri J. Dayal, Financial Commissioner, Railway Board inspected the factory on the 25th October, 1958.

Mr. Richard Fry, Financial Editor of the "Manchester Guardian," London, and Mrs. Fry visited this factory on October 28, 1958. They were shown round the workshops and the Technical Training School. At the conclusion of the visit they observed that they were greatly impressed with the lay-out and efficiency of this fine new plant."

TAJ MAHAL

BY

A. VENUGOPALA MENON, A.L.W.I.

Before going into the details of the Taj Mahal, it will be interesting to have a glimpse into the history of the city of Agra which dates as far back as 3000 B.C. The excavations in front of the Agra Fort indicate that this city was ruled by Asoka the Great, about 250 B.C. The modern city on the right bank of the Jamuna was founded by Emperor Akbar, the hero of the battle of Panipat, in 1558 A.D. and hence came to be known as Akbarabad. During the reign of Sultan Sikandar Lodi also, Agra was the capital of India, the seat of the Government being at the place called Sikandra, a village about 5 miles from Agra, where the mortal remains of Akbar are interned in a big Mausoleum, which was designed and commenced by none else than Akbar himself and completed by his son Jehangir.

The TAJ MAHAL, popularly known as the "Taj" stands on the right bank of the river Jamuna, about 5 miles from Agra Cantonment Station on the Grand Trunk Route. This magnificent mausoleum was built by Emperor Shahjahan, son of Emperor Jehangir and Queen Jodh Bai, to the loving memory of his beautiful and devoted wife the Empress Arjumand Bano Begum. She was the daughter of Asaf Khan, the brother of the famous queen Nurjahan and the foremost nobleman of those times. In the year 1612, she was married to Prince Khurram, known as Emperor Shahjahan on his ascending the gadi. On account of her exquisite beauty, accomplishments and soft-heartedness for the distressed, Jehangir conferred upon her the title of "Mumtaj Mahal" or 'Exalted of the Palace.'

The tie of mutual love between Shahjahan and Mumtaj was so strong that Mumtaj remained with her consort like a shadow, during their entire marital life of 17 years. Mumtaj's death occurred at Burhanpur, where Shahjahan camped while conducting the campaign against a rebellious Governor of Deccan. Mumtaj's death hurt Shahjahan's heart grievously. For several weeks, he refused food or to see any courtiers or to transact any business of the State. He even contemplated resigning his throne and dividing the Empire amongst his sons. On every Friday he visited her grave and prayed with solemnity for her soul to rest in peace.

After his successful campaign in the Deccan, Shahjahan returned to his capital, Agra, with the marital remains of Mumtaj and invited designs from far and wide for the building of a mausoleum in her memory, according to her last wishes. For the construction of this marvellous building, Shahjahan invited to his court eminent architects and sculptors of his domain, and from foreign countries like Persia, Arabia and Turkey. The white marble so lavishly used came from Jaipur, the red sandstone from Fatehpur Sikri, about 25 miles from Agra and the precious stones from the various parts of India, Persia and other places. It is said that twenty thousand men worked daily for seventeen years to complete the mausoleum, rightly regarded as one of the wonders of the world. Though the exact amount spent on its construction is not available, opinion on this point varies from 50 lakhs to 6 crores of rupees.

The three-storeyed *Main Gateway*, 151 feet by 117 feet rising to a height of 100 feet, stands on a red stone platform. Down the steps of this Gateway, lies the spacious garden surrounded by high walls resembling those of a Fort, and at the centre of each wall is a three-storeyed shrine. The marble tank and the fountains in the garden are supplied with water from the Agra canal. *The Great Basement*, 995 feet by 365 feet, is built of red sandstone. At its west and east ends are the Masjid and Jamat Khana (Guest House).

The Marble Basement, 313 feet square, rising 18½ feet high from the great basement, has five faces of an octagonal tower projecting from each corner, to a length of 60 feet at the centre of the front side with two staircases each with 21 marble steps.

The Minarets, four in number, are entirely built of marble and are at the corners of the basement rising to a height of 164 feet above the ground level. Each has a winding staircase internally.

The Tomb is built entirely of marble and is 186 feet square. The large inner archways are beautifully inscribed with the text of the Holy Koran. The height of the roof and the point of the spike of the central dome is 140 feet and 243 feet respectively from the garden level.

The Great Central Dome 50 feet in diameter is crowned by a floral cap at the centre. The metal spike upon it is 30 feet high and is said to weigh 2,650 lbs. The basement rooms are centrally situated, fourteen in a line.

The Cenotaph Chamber contains the Cenotaph of Mumtaj Mahal in the centre and that of Shah Jahan closely by the left, both profusely decorated and inscribed beautifully with texts from the Holy Koran. These Cenotaphs are enclosed by an exquisitely worked marble screen, octagonal in shape. On entering the building containing the Cenotaphs, foreigners uncover their heads and go barefooted as a mark of reverence. Any sound made inside this chamber reflects a singing echo lingering for a full 15 seconds. The real tombstones are housed in the Mortuary Chamber right below the cenotaph chamber which is reached by descending a flight of a dozen steps.

In fine, let us bow our head in humble reverence to the planners, designers, architects and the thousands of workers whose persevering labour over the years went to make this matchless and marvellous edifice, one of the foremost prides of this great ancient country of ours.



NEWS FROM SWITZERLAND

(Published through the kind courtesy of the Consulate-General of Switzerland, Bombay)

Inauguration of the highest dam in the world

On the 17th of September, the Mauvoisin electric plant was officially inaugurated. It constitutes one of the greatest works accomplished by Swiss Civil Engineering in the domain of hydro-electric production. The dam supplying the water for this plant is the highest in the world (775 feet). Its bulk represents 71.5 million cubic feet of concrete, in the shape of an incurved wall, 180 feet thick at its base and 46 feet wide at the top, over a length of 1,705 feet.

Fifty years of architecture in Switzerland

On the occasion of its fiftieth anniversary, the Federation of Swiss Architects organised an open air exhibition in Zurich, entitled "Fifty years of architecture." The show consisted of a series of photographic panels illustrating the evolution of architecture during the last half-century, both in Switzerland and abroad. This exhibition, which is of great documentary interest, shows that Switzerland has not remained behindhand in the field of architecture, but, on the contrary, occupies an outstanding position.

Birthday of a famous Swiss Engineer

The famous engineer and bridge-builder, Mr. Othmar Ammann, recently celebrated his 80th birthday. After some years' activity in Switzerland and in other European countries, Othmar Ammann emigrated to the United States where he became Chief Engineer of the authority of the Port of New York. He built several bridges in America, in particular the Georges Washington Bridge, which ensured his universal fame. Having retired some fifteen years ago, the famous engineer has lived since in his own country.

Swiss machines at the exhibition "Atoms for Peace"

At the international "Atoms for Peace" exhibition, which was held in Geneva one could see a small 1:33 model of a project nuclear power plant, combined with a district heating station for a total heat output of 30,000 kw. This plant, which is intended for the Swiss Federal Institute of Technology, in Zurich, will be installed in a chamber, some 131 feet underground. It has been worked out in detail by a Swiss study group, with the collaboration of three important Swiss firms, namely the Oerlikon Engineering Company, Escher Wyss Ltd. of Zurich and Sulzer Brothers of Winterthur, the last-mentioned firm having, moreover, been entrusted with the overall planning. The reactor, which will be housed in a chamber of 65 feet in diameter and of 131 feet in height, will use predominantly natural uranium as fuel, whilst the total quantity of heavy water required will be 18 tons.

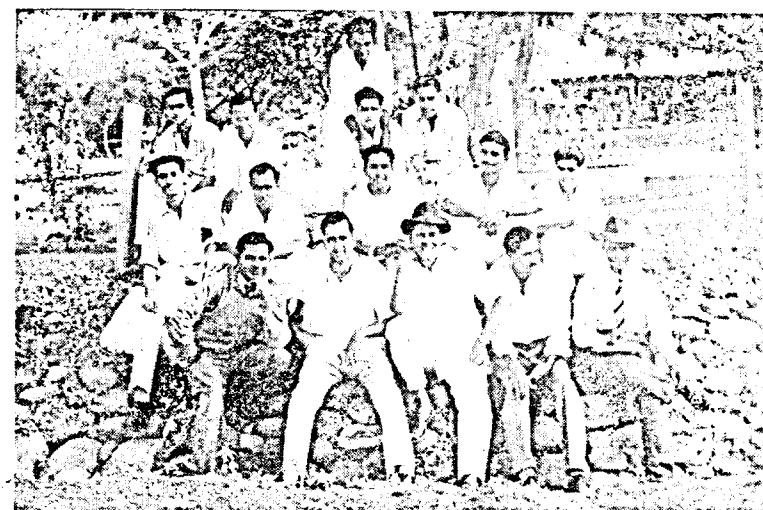
Swiss "speleological" watches

Speleology belongs at the same time to the domain of sport and scientific research. The conditions which prevail under the ground—total darkness, humidity and cold—the changes in temperature and the efforts required for their work, demand from the speleologists a great power of resistance. The same can be said of the watches which they wear and in which they must be able to have every confidence. Recently a watchmaking factory at La Chaux-de-Fonds equipped all the members of the 1958 French Speleological Expedition with automatic chronometers, which are both water-tight and anti-magnetic, and are provided with

a special luminous dial. Under very hard conditions, subjected to shocks, in an atmosphere saturated with humidity and frequently plunged into ice-cold water, these chronometers, which were controlled every day, gave excellent proof of their exceptional qualities of solidity, water-tightness and precision. The expedition to the Coume-Ouarnede, in the Pyrenees, which descended to more than 1,725 feet below the ground, was placed under the leadership of four speleologists, among them being the famous Nobert Casteret.

The picturesque Brienz-Rothorn steam railway to disappear

Progress in electrification and engineering has claimed another victim. The Brienz-Rothorn steam railway, one of the two last cog-wheel mountain railways operated by steam, will soon disappear. The shareholders of the company have decided that the old steam horses are no longer economical and should be replaced by a more modern and efficient cable-car. Many mountain-lovers, and especially children, will regret the disappearance of the faithful old "puff-puff."



A party of staff from the Production Engineer's Office went on a picnic to the Poondy Reservoir on the 19th October 1958. Photograph shows the group at the Reservoir site.

SHORT STORY

LOST AND FOUND

M. V. B. S. Sarma

While I am an ardent admirer of Sherlock Holmes, my wife is a staunch supporter of Callaghan, of Peter Cheyney fame. My nephew, a new entrant in the field but a fossil in the intermediate class, because he likes the climate, thinks that we don't click with modern tastes. He declares that the greatest genius the world ever saw is Perry Mason. As a family, we represent a homogeneous unit, but in regard to our "Thriller Tastes"—well, you know where we are.

As for myself, I believe Sherlock Holmes has enunciated certain universal truths in the matter of criminal investigation. They are unaffected by time and space. They will educate, enthuse, and inspire several generations. But my wife has other opinions in the matter. She asserts that the era of foot prints, finger prints and magnifying glasses has gone. Crime detection is nowadays a perfect science perfected in the psychological laboratories of a human mind. She points out that Callaghan moves with criminals, literally rubbing shoulders. He kisses any girl that comes his way, knowing full well that she would not mind to stick a knife in his chest. He fights prize fighters. He is a true philosopher and psychologist. Has he any assistance from any one? The one assistant he has is a thundering fool who always has his eye on the boss's Canadian whisky and the packet of Lucky Strikes. If ever he tells a story, it has already been told. Callaghan is never worried about this incompetence of his assistant. Right from the beginning, he knows his criminal, almost by instinct. No faltering. No fumbling. No

cross-examination and no deductions. At the end he neatly fixes up the 'boyo.'

My nephew butts in and tells, "What is wrong with you folks? Your thrillers ain't have any kick. No sparkle. They don't give a damn to the police. Can't handle cases in law courts like Perry. They know goddam little of law. Don't know Penal Code. Don't know how to corner Holcombe or Lieutenant Tragg of Homicide department. Can't introduce witnesses, create faked evidences where there were none. The proper qualification for a modern detective is to be a lawyer. As perfect as Perry. To function properly he must have a "One in million" attractive sec. After I finish my B.A., I gonna study in law. In the Law College, I propose to meet a Della" He whisked up his seven loops pant and adjusted his tubernised collar.

"What is the bulge in your trouser pocket"? I asked. "Looks like match box. Have you started smoking"?

"No, uncle. My pal should have accidentally put it." He grinned and beat a retreat.

These are days of individual independence. In our days, when the antennae on the uncle's upper lip quivered, we knew there was going to be thunder even though the weather bulletins discounted such possibilities. Those days have gone.

Whatever be our personal preferences to investigational heroes, I always followed Holme's technique. One fine morning, my boss lost his Parker 51 kept on his table.

Not exactly a loss, let us say for the facility of terminological exactitude, accidental disappearance. I slipped into his room, examined the floor and immediately concluded that it was an inside job. My conviction was so strong that I even declared it.

My boss grew irate and shouted "You mean that I kept my pen in my own blinking pocket?" I did not reply.

I brought my scrappy knowledge of Trigonometry into play and calculated the secant and tangent of the table *vis a vis* the waste paper basket. I neatly walked to the basket and picked up the pen from its inside as my boss beamed in dismay. You see! There were only boss's foot-prints on the floor and they all pointed to his chair. That was how it was an inside job!

At about the same time, in the evening by 8 p.m. I discovered the loss of my old 'Tudor' bought in the "Prior to devaluation" era. There were no other callers except my brother-in-law with his kids. I was quite sentimental about the watch. So was my wife. In fact, a portion of the cost of the watch was met from her private finances under the aid. Yet another portion was debited to my friends' savings account on which I had confiscatorial rights. I wanted to investigate the loss thoroughly, even if it meant to the bitter end.

I called my maid servant and put her through the routine questioning. She sensed the fish and began to talk very fluently in very chaste desanskritised Hindi. The burden of her extemporaneous peroration amounted to a disbelief in the moral background of my ancestors. She at once resigned. My wife blamed that I

made a mess of it by my stupid cross-examination. She threatened that the additional chores consequential to the maid's resignation will devolve on each member of the family in an equal measure. For a man like me, conservatively brought up, it was a big jolt, this unexpected upheaval of Marxian philosophy in our household, "from each according to his ability."

My nephew with an idea to help and in a 'summit' spirit said, "After the dismal failure of Holmes' technique, we better use 'Brink therapy.' Drake's agency which handles such jobs as the subject-matter, which are incidentally not in Perry's line, could certainly help. However, a confirmation from Tragg is necessary that he has not revoked Drake's licence when it came for renewal." I said, "Shut up."

After a week or so, when we were finally reconciled to the loss, my brother-in-law called in.

"Look. You know what happened? This impish son of mine took away your watch when I came last. The servant-maid, while washing the clothes, found it in his pocket and handed it to me. Very upright of her; is it not? Yes the same woman She is your servant-maid too. I thought you would not have worried much about it. It is such an old thing you know?"

I had to swallow my ruffled feelings caused by his unwanted references to my watch. My nephew, when my brother-in-law left, declared that he objected to his remarks as irrelevant, immaterial, and impertinent.

The watch was found, of course, but the mystery of the loss is yet to be solved.

THE INDUSTRIAL ENGINEER IN TRANSITION

BY

PROF. R. F. BRUCKART

The first two papers have dealt with the present-day professional aspects of industrial engineering, and the social responsibilities of the modern industrial engineer. It seems appropriate that some recognition of the transitory condition of industrial engineering should be made, hence this third paper deals with the industrial engineer in transition.

The meaning of "Transition"

To say that a person, thing, organization or profession is in transition means that it or he is going from some place or condition to some other place or condition; it suggests that there is a movement under way, that changes are occurring, that old habits, customs and methods are giving way to new habits, customs and methods.

When one suggests that such transitional changes are occurring in the field of management, it is taken for granted that these changes are improvements, better methods, more efficient techniques, which are replacing less efficient methods and out-of-date techniques. This positive transition is also a feature of industrial engineering, just as it is of management as a whole.

The Past vs. The Future

It is difficult to find objective terminology for differentiating the present and past states of industrial engineering, from the future brand of industrial engineering. One might make a distinction on the recognition that what is now regarded as "traditional" industrial engineering has been the result of the *first* industrial revolution, while the future equivalent

is the end product of the *second* industrial revolution. The second industrial revolution is, of course, characterized by such items as the trend towards automation; automatic factories; the computing machine in industrial management; extensive use of mathematics, statistics and other pure sciences in industrial engineering and in industrial management in general.

If, as many people suggest, we are now just within the threshold of the industrial engineering of the future, then it is apparent that the industrial engineer who must rely on "traditional" techniques and mellowed points of view may quickly find himself outdated, and suddenly and distressingly left behind by the quick advances which are taking place in industry. One authority has already suggested that any industrial engineer who has not received his education within the last five years is likely to find himself utterly confused by the new terminology and the new concepts arising in this field. The industrial engineer must by the nature of his position be a leader—when he stops leading, he has lost most of his usefulness to industry. He must be a suggester of ideas—new ideas—a progressive influence in stimulating management towards more efficient methods—he must in short pave the way by new and progressive ideas towards more productive management.

If it is true that this is the situation in which the industrial engineer finds himself, then it is expedient that he should have some conception of the face of the future in industrial engineering.

The future of Industrial Engineering

Probably the most influential aspect of the future in industry will be the widespread adoption of automation—the development of the automatic factory. Naturally this will arise first in those industries which already are large-volume industries where mass-production techniques are already in use. Furthermore it will arise first in those countries in which industrialization is already well-advanced, for it is merely a logical step in advancing industrialization. As industrialization is a process which does not lend itself readily to crash programmes, nor permit the jumping of progressive stages of development—as one might move pieces on a chessboard—those industries and countries in which industry is not yet fully matured may be in a position to prepare for this step, and may profit by the mistakes of those who have provided the leadership, as they advance through the preparatory stages of industrialization.

But let us look at what may be found X years hence, and then view the position of the industrial engineer in that structure of industry.

Let us assume that we are considering the mass production factory of the future, in which through the traditional production line, large volume low-cost products are produced. Such production lines presently depend on labour of a minimum number to carry through the operations performed in that efficient arrangement of men, materials and tools. In the automatic factory of the future, one may visualize that the sequence of operations will be controlled by some version of a modern high-speed computing machine. This computing machine will not be restricted to ordinary mathematical tasks, but will carry out the task of channeling a series of orders concerning mathematical operations. Orders will be fed into this machine on tapes, on which predetermined requirements are already established. The computing machine, therefore, is the centre of the automatic factory,

although it is not the entire factory. That is, it receives detailed instructions from elements stimulating sense organs, such as photo cells, condensers, thermometers, hydrogenion concentration meters, and many items of instrumentation now available from instrument companies used in manual control of industrial processes. These instruments are already built to report electrically at remote stations. By providing a reading apparatus they may be converted into automatic operation, so as to introduce information into an automatic high speed computer, to translate positions on the scale into a pattern of consecutive digits. This apparatus already exists and offers no great difficulty in principle, or in construction. The sense-organ problem is not new and is already solved.

In addition, there will need to be certain components or effectors, such as already are in existence in some respects, *i.e.*, valve-turning motors, electric clutches, and so on. Some still have to be invented, so as to duplicate the human hand and supplement the human eye.

These instruments act as sense organs and record the original state of the work and the result of the previous processes. The machine, therefore, carries out feedback operations, and will stimulate the complete animal or human with sense organs, effectors and proprioceptors. It will not be dependent for its experiences and for its effectiveness on our invention.

Already certain automatic machines have come into use in the continuous-process industries like canneries, steel-rolling mills and wire and tin plate factories. They are also familiar in paper factories and other continuous process industries.

In certain industries where the process is continuous, it is necessary to exert a control over the quality of the product. This may depend on a sampling process—specifically

the sequential sampling process. This process may readily be transferred to a computing machine, and performed mechanically, even though the logic behind it may not be understood. In other words, except at the highest levels, the machine takes care of routine statistical controls, as well as the production process.

Furthermore, there is an accounting procedure independent of production. The data which occur in cost accounting from the machine or assembly line may be fed directly into a computing machine. Other data may be fed in from time to time by human operators, but much of the clerical work can be handled mechanically, leaving only the extraordinary details such as outside correspondence for human beings. But even this outside correspondence may be received from the corre-

spondents on punched cards, or transferred from punched cards by very low grade labour. From here on, everything works by machine.

It is clear that the machine plays no favourites between manual labour and white-collar labour, for the fields in which the new industrial revolution may penetrate are very extensive, and include all labour-performing judgments of a low level, in much the same way as the displaced labour of the earlier industrial revolution included every aspect of human power.

There will be trades and companies in which the new industrial revolution will not penetrate either because the new control machinery will not be economical, or in industries which are too small-scale to handle the considerable capital costs involved, or because their work is so varied that new taping would be required for each job. Judgment-replacing machinery

may not enter the small grocery store or corner garage, but they may be used by the wholesale grocer and the automobile manufacturer.

It is not our interest here and now to enter into speculation as to the social and economic aspects of such revolutionary developments. To do so would at best be purely guesswork, and a guess that the development may be *evolutionary* rather than *revolutionary* may be as sound as any. But be that as it may, we are interested primarily in the position of the industrial engineer. What sort of fellow will he be then, and what will he do? What influence will these changes and others which will accompany them have on the responsibilities and accomplishments of the industrial engineer?

The Industrial Engineer of the future

One of the traditional techniques of industrial engineering which is sure to be affected by the advance of automation and new techniques is *time study*. As the proportion of the task performed manually is diminished, so there will be a diminution in the importance of time study. If automatic controls utilizing computers are adopted, many problems of measuring output and production speeds will be dealt with mechanically. The speeds will be built into the machine and the role of the operator will be minor. The rate of the output will be determined by the machine, and the old problems of performance rating and fatigue allowances will be by-passed.

A second expectation is that wage incentive plans based on individual output may become outmoded in the face of automatic operations. The usual method of paying the worker on the basis of output will no longer be a reasonable procedure, for in an automatic factory, all operations are inter-related, and nothing is gained by encouraging the worker to increase his output. In fact, the nature of the technology is such that there will be a definite limit on the ability of the individual to increase his output.

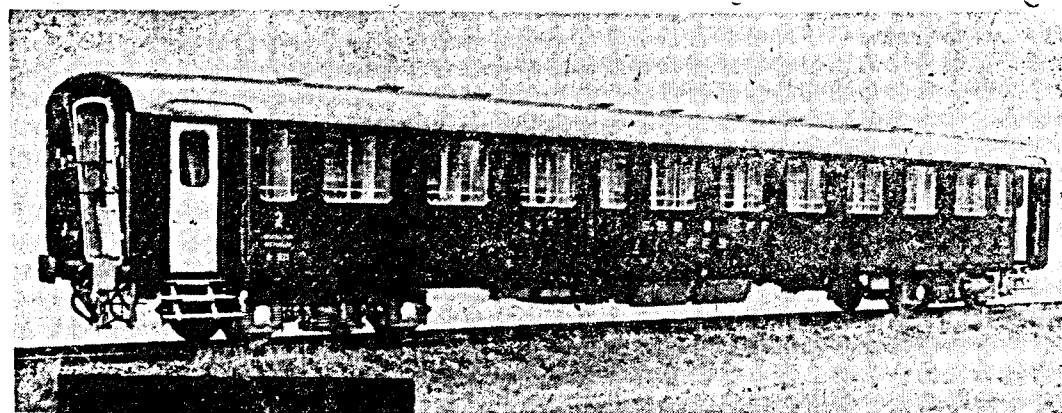
The frequently observed problems of wage incentive administration will therefore also be avoided.

It would be improper to assume that wage incentives will disappear, however, as they may continue as group plans, in which the most important aspect will be the elimination of downtime rather than the increase of production.

Furthermore, in another area: *job evaluation*, considerable revision will be required. To function effectively, job evaluation plans must provide a realistic wage structure.

The increasing use of computers will result in a shortage of personnel with certain skills, and this will cause wages on certain technical jobs to be bid up relative to those on other jobs. The problem will be further complicated by the fact that the weight given to the various factors under most point-systems of job evaluation will not reflect the value of all of the new jobs. It is likely in the automated factory that the worker may be nothing more than a machine "tender," that is, may merely watch a series of gauges; so working conditions will be excellent; hazards will be a minimum; physical and mental effort will be slight; training requirements may be very short; and so forth. Yet in crises, the worker may have to take quick, corrective action—so perhaps greater weight to the matter of responsibility will be needed. Attention to such matters as boredom will be required—and in fact the entire job-evaluation procedure may have to be rewritten.

Another effect to be expected is *the revised emphasis on methods study*. The attention given to making manual labour effective will become less important in the manner now visualized. It may be replaced by study of the operating organization as a whole, tracing the flow of information to point of final action, determining the required time for processing transactions, and selecting machines and methods



Schlieren

**Mainline Coach type B4ü for
International Traffic built by
SCHLIEREN**

9 compartments totalling 54
seats.
Air-heating combined with press
air-ventilation for summer ser-
vice. These coaches are equip-
ped with the latest bogie type
SCHLIEREN w. helical springs.

Length over buffers 23,7 m;
Tare weight: 33 tons.

Swiss Car and Elevator Manufacturing Corp., Ltd., Schlieren-Zurich (Switzerland)

to meet the needs of the company as a whole. To perform this "systems engineering" the industrial engineer must have a thorough grasp of company operations and a wide knowledge of the capacity of computers.

The conversion of electronic data processing will probably stimulate methods improvements. Analysis through systems engineering may reveal significant savings from methods changes and the organization may be psychologically prepared to accept such changes which were resisted. Adoption of such methods changes may avoid the personality conflicts which more usual types of methods changes commonly create.

Industrial engineers will have to develop new skills, particularly in the field of mathematics and the pure sciences. Use of the computer provides a mechanism by which problems of management may be solved mathematically. Certain types of complex decisions can be made by computers in a more efficient manner than otherwise, for instance, in calculating economic lot sizes. No longer will it be necessary to calculate each specific item separately, but all items can be considered simultaneously. Thus more and more mathematical models will be used in decision-making, and the industrial engineer will need to develop new skills in mathematics.

Thus we might visualize the face of the future for industrial engineers, as it may develop in the highly advanced industrial areas of the world. But what of Indian industrial engineers? What part will they play in this vast panorama?

The Future for the Indian Industrial Engineer

At the present stage of development of Indian industry, it would be visionary to anticipate quick transition to automatic factories and it would be unrealistic to expect identical industrial situations to exist here as in various other parts of the world. Consequently we

should consider the industrial engineer in India and analyze the transitional stages through which he is now passing. For it is equally true that industrial engineers in India—few though they may be—are faced with as rapidly a changing industrial environment as in most highly developed industrial countries, although of somewhat different nature.

The industrial engineers and the organizations of which they are a part can do vastly important tasks to advance the interests of this country. One of the most important of these responsibilities and opportunities concerns the matter of *understanding the meaning and importance of industrial engineering*. The industrial engineers here are entering a period when they must accept responsibility for enhancing the knowledge of industrialists as well as workers and Unions into the nature and opportunities in the field of industrial engineering.

The transitional stages of industrial development require the acceptance of new concepts in industrial management, and the industrial engineer, if he is to come into a stage of importance in Indian industry, must be accepted and desired by industrial management. Only then will pressures be created by which educational institutions will produce men adequately trained in this field of activity. The industrial engineer of the near future, therefore, must accept responsibility for being an educator. Naturally his good work is likely to be the most influential encouragement for creating more of his kind. Negative effects would create the opposite results, of course.

The Future of Industrial Engineering in India

The industrial engineer of India is passing into a stage where the level of his professional activities must and will rise in quality. Manufacturing is only now becoming an important part of the economy, and only the most forceful

and effective work on the part of the industrial engineer can show an effect on overall conditions of living.

The industrial engineer in India is entering a period when he *must unfailingly participate in professional activities, meeting seminars and, the like*, so as to encourage and stimulate industrial acceptance of the philosophies of good management.

He will be obliged to accept more and more responsibility for participating in educational activities designed to advance and strengthen the hand of progressive managers.

Part of the educational programme which is being thrust upon the industrial engineer in India is the need for creating an *understanding and overcoming the fears of the words and phrases which have so frequently had evil-sounding connotations*. By his works and by his words the industrial engineer must overcome fear of time study, methods study, incentive wage plans—and such words as redundancy, rationalization, and the like must be minimized as terms frightening to the worker, and against which he automatically rises in protest.

In passing, it is noted that it is inadequate to let this task of explanation to the politician, for even in the best of conscience, he does not look upon these matters in the same light as the industrial engineer, and cannot present facts with the same point of view as one intimately concerned with these matters.

The meaning of *productivity* and its importance requires unlimited explanation and re-explanation, and the Indian industrial engineer is entering a period when, in this respect, his tasks become more and more urgent. If this task is not accepted and grappled with vigorously, more and more industrial conflict will arise as new management techniques are advanced on workers whose understanding

is inadequate to cope with the revolutionary changes which are sure to occur.

The Indian industrial engineer has an opportunity to prepare in advance for the advent of advanced industrial practices such as automation and the more advanced labour-saving items of equipment. These things will not come overnight, and the industrial engineer here is fortunate in having a period in which preparation for introduction and acceptance of such items may be planned. This responsibility is not one he can cast aside or take lightly, however, for under undesirable conditions industrial conflicts and disputes seem to rise in geometrical proportions as the number of industries adopting advanced industrial practices increases in arithmetic proportions. Consequently it is not only expedient that attention must be given to this matter—but imperative that it be dealt with.

Industrial engineers not only exist and work in private organizations, but also in consulting firms. It is important in these changing times in India that the *industrial engineer in consultation advance with the times*, offering new and better management services. Reliance on production—standard setting and occasional job evaluation installations as the basic activities may continue for some time, but there must be an enhanced scope of activities in consulting work, for consultants are technically experienced specialists, who presumably are to offer the most advanced and progressive policies and techniques for management. The industrial engineer in India in consulting work must expect to raise his sights if he wishes to keep up with the times. Certain techniques and practices commonly used now in Western industry and consulting practice are not yet or are little used here. This vacuum must be filled, and the "new" industrial engineer has a responsibility for doing so at the earliest possible opportunity.

Another area in which industrial engineers must enter in India concerns the fields of research, in matters of industrial practice of interest to the industrial engineer. He must advance and stimulate research in his field, particularly through the educational institutions now capable of carrying out such work. Many features of the industrial scene in India are dissimilar to those of the Western countries, and research must be undertaken to reconcile or adapt Western practices to Indian conditions.

The industrial engineer to come must use his influence to advance such research, and must use and relate findings to advance his own and his company's practice. Use of the influence of industrial engineering groups to recommend and secure industrial grants and scholarships for such research is not only a privilege of the industrial engineers but is a responsibility as well. Such research may in itself overcome some of the fallacious ideas and unrealistic fears existing in industry concerning his work.

Hand-in-hand with these activities for general acceptance of his profession, the industrial engineer must be certain that *under all circumstances he as an individual does the very best job possible.*

The industrial engineer of the future in India may not immediately change in the type of work he does, for some years, but it is certain that as his place in industry is established, the level of quality of his work must rise. Where rule-of-thumb procedures may get by these days, the counterpart of tomorrow will be obliged to have a higher standard of activity, for understanding of his work is more general. As understanding rises, the demands for improved quality rise also.

In general, the industrial engineer of tomorrow must play a part of more importance in industry, in advancing progressive management practices; in education in advancing the number and quality of industrial engineers

being fed into industry; in consultation, by offering better and newer techniques and philosophies of management.

It has been suggested that the present age is suffering from "machine megalomania", confusing technical and mechanical progress with progress itself. In its fond admiration for machinery, it ends by admiring the instruments of transmission themselves, rather than the value of the thought transmitted. The dignity of man, said Pascal, is in thought.

Technical progress, then, puts wonderful instruments in our hands. The trouble starts when, in the midst of what is technical, we meet what is human. The job of the industrial engineer is to maintain a sound judgment and level-headedness under these conditions, so as to provide a leadership vital to industrial management.

The opportunities for industrial engineers in India are no less—greater possibly—than those of his Western counterpart. That he is working in an earlier stage of industrial development does nothing to reduce the importance of his task.

At this stage of industrial development, changes are rapid and far-reaching in importance, and the industrial engineer has a responsibility of being dynamic—not passive; to plan and think boldly—not hesitatingly; to be a leader—not an unthinking follower; to seek material good without becoming entangled in philosophical or metaphysical deviations. He must think as Jonathan Swift suggested: "whoever makes two blades of grass grow where only one grew before deserves better of mankind than any speculative philosopher or metaphysical system builder."

Conclusion :

In these three papers I have outlined the role of the industrial engineer—in general in world-wide proportions, as well as in local Indian

MARCH OF SCIENCE

U.S. Moon Probe Missile is unique combination of three Rockets

The "Pioneer," the moon probe missile fired at Cape Canaveral, Florida, in America's second effort to observe the moon at close range, is a unique combination of three rockets.

From the standpoint of launching an object into space the firing was a success, but the take-off angle proved a few degrees off and the Pioneer veered away from the moon's gravitational pull. Instead it began to circle back towards the earth but not before approaching a height of 80,000 miles, 30 times further into space than man has ever plumbed.

Primary element for the lift-off of the 88.1 foot vehicle from the launching pad was the Air Force's Thor intermediate range ballistic missile, a fully tested and proven missile. It weighs more than 100,000 pounds and develops approximately 150,000 pounds thrust.

The second stage of the vehicle was a highly-modified version of the Vanguard Rocket—developed by the U.S. Navy to put earth satellites in orbit—with the addition of 8 spin rockets. This stage of the vehicle weighs more than 4,000 pounds and develops approximately, 7,500 pounds thrust.

conditions. One could not ask to be in a more responsible profession than industrial engineering, and could never hope to be in a more responsible position to create good for all men than the industrial engineer. Let us devote ourselves to the vast and challenging tasks before us and be worthy of the name *industrial engineer.*

The third stage was an entirely new rocket. Developed for the Navy's Vanguard missile, it uses a solid propellant motor produced by the Allegheny Ballistics Laboratory. It weighs only 400 pounds and develops only 2,500 pounds thrust.

The third stage and the "payload" instrumentation capsule above it were covered by an aerodynamic nose fairing, which was jettisoned after first and second stage separation.

The payload contains a solid propellant terminal rocket, intended to fire forward to slow down the instrumented capsule as it draws near the moon, thus permitting the moon's gravity to pull it into an orbit. The payload weighs 85 pounds of which 30 pounds are instruments.

The instrumentation package contains batteries, a telemetry system and an electronic scanning device. Telemetry measurements sought include the number of meteorite impacts and the earth-moon magnetic fields.

Separating successfully from the properly functioning first, second and third stages, the instrumented payload reached a velocity of approximately 35,000 feet per second—about 24,000 miles per hour. Such speed enabled the vehicle to escape the earth's gravity.

The instrument-packed payload's success in escaping earth's gravity marks the first time in history such a feat has been accomplished. To date the highest point in space reached by any man-made object is the nearly 2,500 mile altitude attained by the Navy's 6-inch Vanguard satellite, whose life aloft has been predicted at 200 years.

Upon attaining free-flight in space—about two hours after launching—the payload capsule was relaying scientific data to ground stations in Hawaii, England and Singapore which forwarded the information to the Air Force Ballistic Missile Division and the Space Technology Laboratories in Los Angeles. This data included the temperature of the instrument compartment, micro-meteorite impact count, and information about the earth's magnetic field.

If the capsule had been drawn into the moon's gravitational field—this would be about two and one-half days after take-off—it then also would transmit data on the moon's magnetic field and pictures of the far side of the moon, which are not visible from the earth.

Here are a few details about the Moon :

Distance from the earth—

Greatest—252,710 miles

Least —221,463 „

Mean —238,857 „

Nearest approach of moon in October, on the 12th—221,900 miles.

Diameter—2,160 miles. Density— $\frac{3}{5}$ that of earth.

Volume — $\frac{1}{49}$ th that of earth. Velocity of escape 1.5 m.p.s.

Mass — $\frac{1}{81}$ that of earth. Temperature :
Noon +250°F.
Night —215°F.

Period of revolution } 27 days, 7 hours, 43
around the earth. } minutes and 11.5
Period of axial rota- } seconds.
tion.

Average velocity of moon around earth is 2,287 m.p.h., or 3,350 feet per second. (In one hour the moon moves a distance about equal to its own diameter).

Full moon gives about $\frac{1}{465,000}$ as much light as the sun.

Light of full moon is about $\frac{1}{4}$ as bright as that of a standard candle at a distance of one yard.

The geography of the moon is called *selenography*. Over 30,000 craters are visible. These include :

Walled plains—diameter 60—150 miles ; floor not much lower than outside.

Ringed plains—diameter 10—60 miles ; uniform and circular ; floor usually much lower than outside.

True craters—diameter 18 miles to less than 1 mile ; deep and cone-shaped ; deepest is Newtons' Crater with rim 23,800 feet above interior.

Highest mountain is about 5 miles above average surface level.

Rays—bright streaks 5—10 miles wide and up to 1,500 miles long.

Rills—narrow crevices 10—300 miles long and less than 2 miles wide.

“Seas”—14 recognised, large, smooth, dark areas. Cover about half of visible area, predominate in north.

DAWN AT TIRUCHENDUR

BY

S. CHANDRAN

The Almighty has given both happiness and sorrow to all living beings in this vast universe. As long as there is life in the body these feelings can be realised and either enjoyed or suffered. Amongst all the living creatures, human beings alone get the maximum advantage for enjoyment and wonder at the creations of God and at the same time respect him more, with the fear of suffering and hope for greater enjoyment, within the short span of life in the world.

Here is an instance of happiness of one standing very close to the sea, leaving the land behind, facing the dawn of the day and admiring it with devotion and awe, the stupendous work of the Almighty.

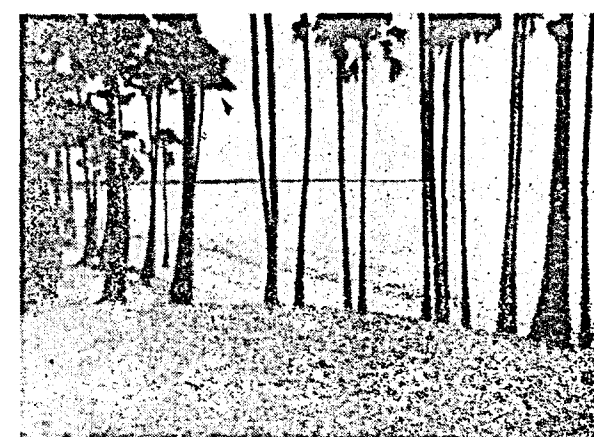
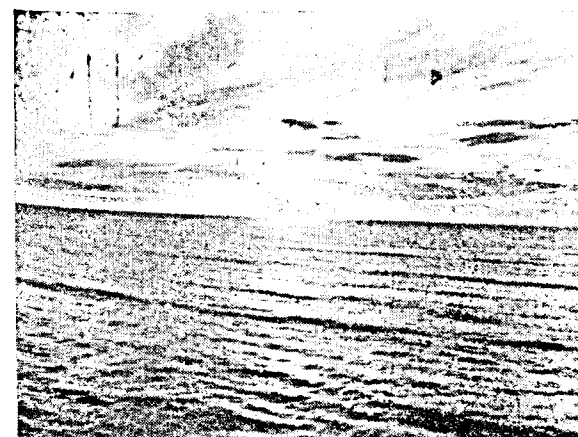
The click of the camera has captured an indelible impression of the beauty of the spot, at that particular time, for others to enjoy the same happiness as the one who clicked the camera enjoyed.

You will see Nature's panoramic beauty unfolded, giving tranquility and pleasure to your heavy heart.

No man or creature is visible in that vast expanse of water but only the gleaming rays of the sun just ready to spring out.

The solitude and tranquility that prevail at the dawn of a day are striking features which should not be missed.

Arresting scenes of the dawn at Tiruchendur captured by the author of the above article



THEY CASHED THEIR IDEAS

Each of the undermentioned was awarded a sum of Rs. 50 in appreciation of the useful suggestions made by them.

1. Shri V. Parthasarathy, Chargeman, T. No. 004, Shop 13.

The trimming presses are provided with auxiliary Rams, by which the jobs viz., (1) Block Hanger Drg. No. 32 010 01 and (2) Bent Coupling Drg. No. 23 007 01 are completed in two operations. By setting up the die for the second operation in the Auxiliary Ram of the Trimming press along with the first operation die, the Block hanger can be completed in the same heat, with a General Tool to suit to the Auxiliary Ram. Investigations showed that the suggestion can be implemented in only one case viz., Brake Hanger Block where a second operation such as flattening following the main trimming operation is necessary. The annual savings will be Rs. 457.20 in this case.

2. Shri N. K. Ramaswamy, Asst. Store-keeper, Stores Depot :

According to the existing procedure, each piece of steel received for stock is being colour marked to a length of 8" at each end, besides the faces, to avoid mixing up of the different varieties of steel while in stock and also to ensure correct issue and identification both by stores and shop staff. If in respect of steel sections conforming to Specn. St. 37/12 of the imported DIN variety (Steel for Coach production only) and to Specn. Class II/M3 or M5 of the indigenous IRS variety (Steel for general purposes) the material colour is painted on both the faces alone of the pieces, then painting for a length of 8" on each end of the piece can be done away with. The reason advanced by Shri Ramaswamy in support of his suggestion is that out of approximate 8½ tons steel sections required for each coach,

about 6 tons conform to Specn. St. 37/12 and that all other specifications of steel than the two referred to above, will be fully colour marked according to the existing procedure and the painting of the respective material colours on the faces alone of the above two specifications would do well to identify them properly. This would result in the saving of labour and paint.

3. Shri G. Ireland, Welding Mistry, T. No. 012, Shop 22 :

When shells are lifted from the main assembly jig and sent to the straightening section, men have to go underneath the shell and do work, such as marking, hammering, etc. Shri Ireland suggested that portable stands of 6 ft. height may be provided to rest the shell on and thus prevent any occurrence of accidents.

The committee awarded a sum of Rs. 25 each to two of the undermentioned staff for their suggestions :

1. Shri G. R. Yuvarangam, Senior Clerk, C.M.E.'S Office :

On an average 42.5 accidents per month were recorded in our factory during the financial year 1957-58 and approximately 2000 man hours were lost per month, roughly 250 man days per month or 3000 man days per year. Shri Yuvarangam suggested that a 'Safety Week' may be celebrated in our factory once or twice in a year to inculcate safety consciousness in the workers.

2. Shri A. N. Appukuttan, Inspector, T.No. 113, Shop 42 :

The Jig for the spot-welding machine (End construction) has no guard. Consequently it caused injury when it ran over the toe of a worker very recently. Citing this example, Shri Appukuttan suggested that guards may be provided for the rolling wheels covering

half of the wheel, which will push away the foot if one happens to have his foot on the track, preventing the wheel from running over and crushing.

The Committee decided to award a Merit Certificate, during the next Railway Week Celebrations, for the undermentioned suggestion.

Shri B. S. Ganesh, Chargeman/Production, P.E.'s Office :

There are at present small libraries attached to the Technical Training School and Designs Office with different systems of issuing books etc. Books in the library attached to T.T.S. are issued only to apprentices and therefore it is not accessible to Factory staff. The books

available in the library of the Designs Office are very limited in number and they are not allowed to be retained by the employee for more than a few hours. Pointing out these difficulties Shri Ganesh suggested that a library may be inaugurated consisting mainly of Mechanical and Electrical Engineering books, preferably pertaining to Railway (Carriage and Wagon) Rolling Stock. Shri Ganesh also suggested that alternatively the T.T.S. library may be expanded and the facilities extended to all or at least to the supervisory staff of our Factory. As a centralised library would benefit a large number of employees, the Committee accepted this suggestion for implementation.

INSTITUTE CELEBRATES GANDHI JAYANTHI

Under the presidentship of Shri S. G. Iyer, Executive Engineer, Integral Coach Factory, the Gandhi Jayanthi Celebrations were held in a befitting manner by the Integral Coach Factory Institute, Ayanavaram on the 5th October 1958 in the evening.

Shri K. Nagarajan, Committee Member of the Institute, welcomed the distinguished guests Sarvashri M. P. Sivagnana Gramani and T. K. Shanmugham and the audience.

Shri Sivagnana Gramani known as "Silambu Chelvar" delivered a very eloquent speech

touching upon several important aspects in Gandhiji's life. He made a splendid comparison of important events from Gandhiji's life with those from lives of great Tamil Poets, Elango, Valluvar, Bharathi and Vallalar. Following his speech, Shri T. K. Shanmugham, the popular Actor, sang a few songs on Gandhiji. The audience numbered well over a thousand.

The Secretary of the Institute, Shri N. G. Pillai, proposed a vote of thanks and, with the singing of the National Anthem, the function concluded.

Wit and Whistle

1. A Scot who had been presented with a flask of rare whisky was walking briskly along the road towards his house. Unfortunately he did not notice a car which was coming towards him and he did not step aside quite in time. He got up and was limping down the road when he noticed that something warm and wet was slowly tickling down his leg.

After looking at it he exclaimed, "Oh! thank god. It is only blood!!"

2. Will you please try to tell who is superior between the following two?

First Scotchman: "I feel some sort of ringing in my head."

Second Scotchman: "You know why? Because it is empty."

First Scotchman: "Don't you feel any ringing in your head?"

Second Scotchman: "No."

First Scotchman: "You know why? because it is cracked."

3. On looking at the Scotchman's tongue the doctor was puzzled. He could not diagnose what was wrong. Thinking that he would find out a clue by asking him a question he asked, "Did you try to taste anything unusual or black in colour or any experience of that type?"

"Nothing excepting that I dropped a bottle of whisky on a road that was just tarred."

4. The same gentleman as above was once walking along a harbour along with a friend while he suddenly slipped off and fell into the water.

A policeman jumped into water immediately and pulled him out.

Without paying heed to the policeman the rescued person started walking off. The

policeman said, "You were half dead while I rescued you, Sir."

"I would have given you a dollar," said the Scotchman, "But because you say I was half dead, I will give you only fifty cents."

5. A Scotchman and an Englishman were leaning against a bar in the tavern when a stern looking bandit entered inside the tavern with a revolver obviously to rob. The Scotchman was very very alert and quick thinking. He immediately hauled out the money and handed it over to his English friend saying, "Here is the ten dollars which I owe you. Please take it before I spend it away."

6. Abraham Lincoln, the well-known emancipator was also known for his ready wit.

Once a congressman came to see him and had brought two persons from the south, merely with idle curiosity. While introducing them the congressman said, "This is Mr. X and this is Mr. Y, sir and for your information they are among the heaviest persons in the whole of the south."

"Oh, I see" said Mr. Lincoln, "But yet I wonder how the south has not toppled up when these people are here."

7. During war, Mr. Lincoln had to face an awkward situation, once. He had his Commander-in-Chief, Mr. Mcglagan, who happened to be making a waiting campaign, as such. Mr. Lincoln realised that it would be fatal to wait any more without taking up the offence. He wrote a letter to Mr. Mcglagan,

"Dear Mr. C-in-C,

If you find that your army has no work to do, may I please borrow it for a while and use it?

Yours very truly,
(Sd.) Abraham Lincoln."

Brain teasers

1. "I have three daughters and one son," said Mr. Ganesh, "and the sum of my daughters' ages is the square of my son's age,"

"Is he the youngest?" I asked.

"No, he's a year older than one of his sisters," said Mr. Ganesh, "and the product of my daughters' ages is two thousand seven hundred and seventy-two. Can you tell me the ages of my family members?"

2. When I was last away on a holiday, the weather might have been worse; it rained on 9 days, but whenever it rained in the morning the afternoon was fine, and every rainy afternoon was preceded by a fine morning. There were 7 fine mornings and 8 fine afternoons. How long was the holiday?

3. Three sets of three anagrams have to be found to fit into the following:—

(1) While we—in the—, my companion said, "If nothing—us, we shall reach Cairo by September."

(2) When—wakes,
And—takes,
'Gainst blackout fate
He begins to—,

(3) The General called his — to hear their—.

4. Three men play a game with the understanding that the loser is to double the money of each of the other two. After three games each has lost just once and each ends up with Rs. 24. With how much did each one start?

5. While three watchmen were guarding an orchard a thief slipped in and stole some apples.

On his way out he met the three watchmen one after another, and to each in turn he gave a half of the apples he then had, and two besides. Thus he managed to escape with one apple. How many had he stolen originally?

6. In a field there are cows, sheep and ducks. There are more sheep than ducks; the sheep and ducks between them have a hundred heads and feet, and are together three times as numerous as the cows. How many cows?

7. Out of a party of thirty-five boys sent out to dig potatoes, there were some who quietly faded away and amused themselves elsewhere. Each of the others, however, brought in the same number of potatoes, the total collection amounting to 3,277. How many boys absented themselves?

Solutions to last month's teasers

1. BINAKOYLA. Because

$$\frac{x}{30} + \frac{x}{40} > \frac{2x}{35}$$

2. By packing it in a cubical case of 4' side and placing it from one corner to opposite. Hence,

$$\sqrt{4^2 + 4^2 + 4^2} > 6'$$

3. Kishi — 42; Ramani — 34.

4. Dhotarmull, Mullmull Kurta Bhai, Mrs. Patloon Singh, Katcha Ram, Mrs. Lungiwalla, Patloon Singh, Mrs. Dhotarmull, Lungiwalla, Mrs. Mullmull Kurta Bhai, Mrs. Katcha Ram.

5. $\frac{13}{(15-10)} \times 20 = 52 \text{ km.}$

6. Shanti—20 years. Meenaxi — 15 years.

NEWS MAKERS

I. Our felicitations to :

1. Shri N. R. Sharma, Chargeman in scale Rs. 260-350 promoted Foreman in scale Rs. 300-400 with effect from 1-10-58.

2. Shri A. Ramadass, Chargeman in scale Rs. 260-350 promoted Foreman in scale Rs. 300-400 with effect from 23-9-58.

3. Sarvashree N. Narayanaswamy, N. H. Krishna, P. Karunakara Menon, Draftsmen in scale Rs. 260-350 promoted Head Draftsmen

in scale Rs. 300-400 with effect from 8-10-58.

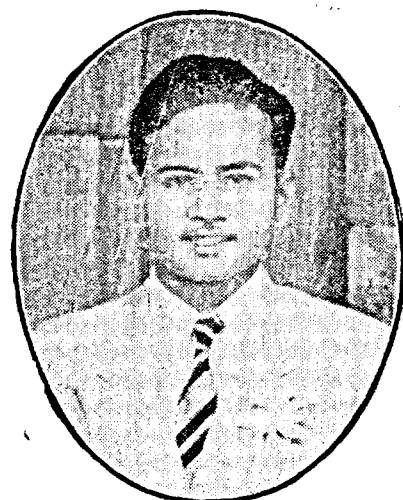
4. Shri P. R. Sundarabashyam, Chargeman in scale Rs. 200-300 promoted Chargeman 'A' grade in scale Rs. 260-350 with effect from 23-9-58.

Our welcome to :

Shri A. R. Mogaliah selected by the Railway Service Commission for the post of Chargeman in scale Rs. 200-300 and posted to Production Office with effect from 23-9-58.

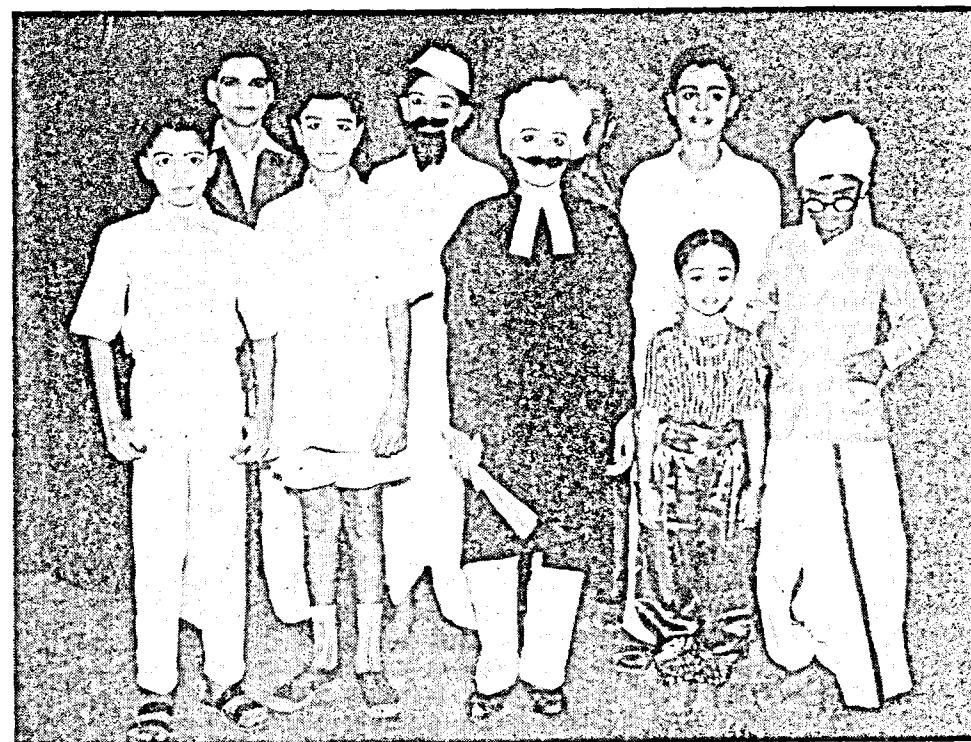
OBITUARY

Mr. Eric Lancelot Taylor, a clerk, who joined the Railway Service in June 1955 soon won the affection of all his colleagues by his charming manners and pleasing dispositions. His untimely death at the age of 25 has robbed the Production Engineer's Office of a lovely and conscientious worker. He leaves behind an aged mother, 2 sisters and 3 brothers. We join the staff of the Production Engineer's Office in offering heartfelt condolences to the bereaved family.



Mr. Eric Lancelot Taylor

HINDI PRACHAR SABHA FUNCTION AT I. C. F. INSTITUTE



—Photo by Dilli Baboo.

The Perambur firka office of the Dakshina Bharat Hindi Prachar Sabha conducted a formal function on September 21, 1958 at the I. C. F. Institute for the distribution of prizes and certificates to students who came out successful in the examinations conducted by the Sabha in February, 1958.

Shri K. Swarup, Chief Administrative Officer of the Integral Coach Factory presided over the function. Shri K. Venkataswami Naidu, Managing Trustee of the D. B. Hindi Prachar Sabha, inaugurated the new classes on the occasion. Shrimati K. Swarup distributed the prizes and certificates.

The students of the Sabha enacted an one-act play "Varanasi ki Vyapari" in Hindi on the occasion. Photograph published above shows the participants in the drama.



—Photo by Dilli Baboo.

Photograph shows Shri K. Swarup, Chief Administrative Officer of the I. C. F., who presided over the Hindi Prachar Sabha function at the I. C. F. Institute on 21-9-58, addressing the gathering.

Others in the photo are (from left to right):—Shrimati Visalakshi Swaminathan, Shri K. Venkataswami Naidu, Shrimati K. Swarup, Shri M. P. Ganapathe of the Hindi Prachar Sabha (standing) and Shri N. Chandrakant Mudaliar, M. A., Lecturer in Hindi.

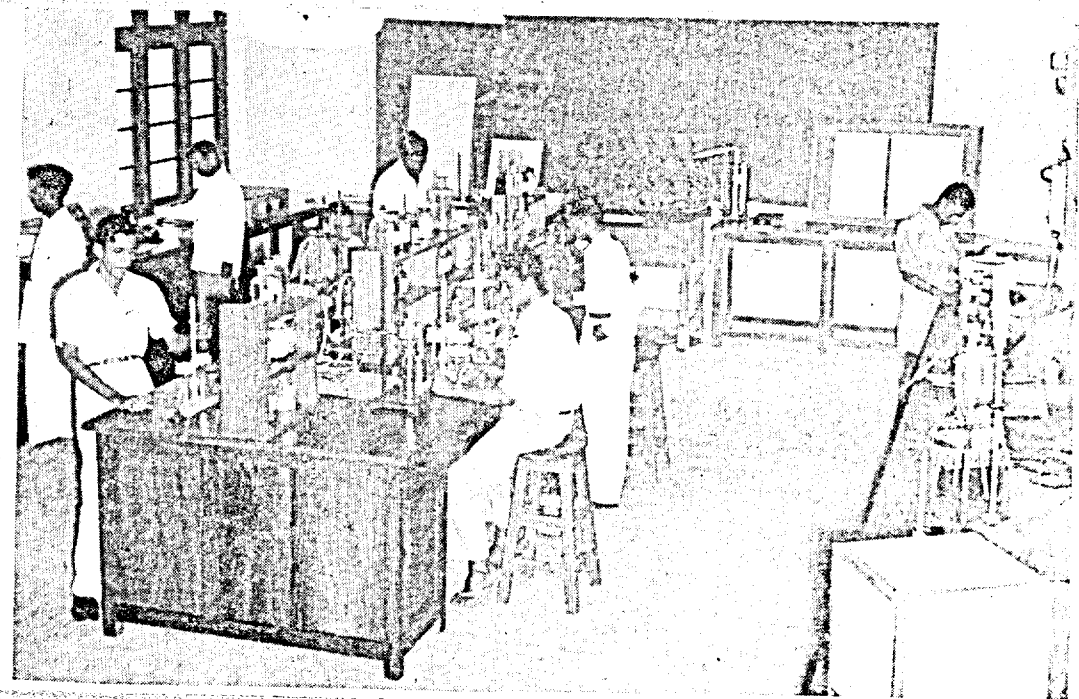
Edited and Published by K. Santhanam, Secretary to the Chief Administrative Officer, Integral Coach Factory, Madras 23 and Printed by M. G. Daniel, at Thompson & Co. Private Ltd (Minerva Press) Madras 1

RAILCOACH

VOL. III, No. 3



DECEMBER 1958



A view of the Integral Coach Factory Laboratory inaugurated on November 8, 1958

RAILCOACH

Published by the Integral Coach Factory
ISSUED ON THE 15th OF EVERY MONTH

Devoted to all Railway problems, Technical Matters
and other problems of General Interest

Rates for Advertising

Per insertion

ORDINARY—

Full page	... Rs. 100
Half page	... " 55
Quarter page	... " 30

COVER —

Front	(Not available)
Back	... Rs. 250
Inside Front	... " 200
Inside Back	... " 200

SPECIAL POSITIONS—

Facing	
(i) Front inner cover	... Rs. 150
(ii) Back inner cover	... " 125
Facing Editorial—	
(i) Full page	... Rs. 125
(ii) Half page	... " 70

By the side of Contents —

Half page	... Rs. 70
Facing contents —	
(i) Full page	... Rs. 125
(ii) Half page	... " 70

Mechanical Data

Blocks	... Screen 100
Full page	... 8" x 5½"
Half page	... 4" x 5½"
Quarter page	... 4" x 2¾"
Cover page	... Art paper one colour
Inside page	... Imitation art paper

CIRCULATION

The "Railcoach" circulates among Officers and staff of the Integral Coach Factory, General Managers and other important Officers of all Railways in the country, the Union Minister for Railways and Transport, the Union Deputy Minister for Railways and Transport, the Chairman and Members of the Railway Board etc.

TERMS

1. Blocks or lay-outs are to be supplied by the Advertiser or will be charged for extra.
2. Advertisement materials to reach the Editor before the 1st of every month for the month's issue.
3. Cheques should be drawn in favour of the Editor, "Railcoach", Integral Coach Factory, Perambur, Madras 23.
4. Texts of advertisements are subject to approval by the management.
5. A 5% rebate is allowed for 12 consecutive insertions.

Further particulars from

The Editor

RAILCOACH

Integral Coach Factory, Perambur, Madras 23

C.A.O.(R.)'s NEW YEAR GREETINGS

Today, the year 1958 is drawing to a close, and tomorrow will see the birth of the New Year 1959. During the year 1958 we have made significant progress in all directions. The Shell side has achieved an outturn of 33 shells a month, i.e., 3 shells a month more than the maximum target fixed for us. The Furnishing side has already developed a capacity of furnishing 15 coaches, with the temporary facilities available. The costs are also coming down.

The year 1959 will again be a year of hard work and toil for us. During this year we hope to go into a Second Shift to produce 40-50 coaches a month. On the Furnishing side we have got to step up the outturn of 15 coaches to 25 coaches a month. The year 1958 saw the end of the intensive phase of Swiss collaboration. During the year 1959 the few Swiss experts that we have will also be leaving. It will then rest entirely on us to fulfil the task assigned to us.

On this occasion I wish to convey to each and every member of the I.C.F. Family my warmest good wishes for a happy and prosperous New Year.

31st December '58

Madras-23



Our old Chief, Shri Sadagopan, has not forgotten us on this occasion, and I reproduce below the message received from him :

"Swarup, Rail Coach, Madras,

Heartiest congratulations to you and all Officers and Staff on splendid achievement(.) Best wishes happy prosperous successful New Year (.) Sadagopan."

(K. SWARUP)

CHANDA PAINTS

FOR QUALITY & ECONOMY
FOR BETTER COVERAGE

IN WIDE AND VARIED USE THROUGHOUT OUR COUNTRY
BOTH FOR INTERIOR AND EXTERIOR PURPOSES

RENOWNED FOR DURABILITY AND FINISH

"INERTOL" PAINTS

For Iron Concrete, & Steel — the best aseptic water proofing
compound — for use on Piers, Quay Walls, Foundations
Granaries, Locks, Lock Gates, Cranes and etc.

INERTOL PAINTS ARE USED ON EVERY COACH THAT LEAVES THE
INTEGRAL COACH FACTORY

MANUFACTURED BY:

Messrs. P. C. Chanda & Co. Ltd.
CALCUTTA

Represented in the South including

Madras, Mysore, Kerala & Andhra Pradesh

By

The South Indian Export Co. Ltd.

20 General Patters Road, Madras 2

Telegrams : Dieselage Madras

Telephone : 84127

RAILCOACH

(INTEGRAL COACH FACTORY MAGAZINE)

EDITORIAL NOTICE

All contributions must be clearly typed and doublespaced on one side of the paper only, and signed, not necessarily for publication, but as a guarantee of good faith.

Manuscripts and photographs, not accepted for publication, will not be returned unless the sender so requires. Intending contributors from outside our Factory, if they intend to get back unaccepted articles and photos, should send a suitably stamped and self-addressed envelope along with the material sent by them.

Contributions should be addressed to the Editor, not by name, and reach him not later than the 25th of every month for consideration for publication in the next month's issue.

The Editor does not assume any responsibility for the accuracy of the news supplied by correspondents or for opinions expressed by contributors. Opinions expressed in the "RAILCOACH" whether editorially or by contributors should be regarded as having no official authority.

Annual Subscription ... Rs. nP.
3 00

CONTENTS

DECEMBER 1958

	PAGE
Cao(R)'s New Year Greetings	1
Editorial	4
What is News and Why	5
Points to Ponder	8
I.C.F. Children's Excursion to Delhi and Agra	11
Wedding Bells	14
Towards Better Teaching	15
March of Science	20
Good Health is Man's Birthright	24
Lectures for Supervisory Staff of the I.C.F.	27
News from Switzerland	28
Inauguration of the I.C.F. Laboratory	29
Universal Children's Day in I.C.F.	30
Opening of new Office premises for Depot Stores	31
Visitors to the Factory	32
Integral Coach Factory Institute	33
Cooperative Week Celebrations	33
Wit and Whistle	34
News Makers	34

INAUGURATION OF PROMOTION COURSES

The urge to rise higher and higher in life is a natural instinct in all human beings. Those of the factory in the lowest rung of the ladder are no exception to this. It is in appreciation of this aspiration, promotion classes were started for the khalasis. The intention is to give necessary training to staff of different categories so that they can develop their ability and rise high in their career. The promotion course which has been started for the khalasis will be a regular feature and all khalasis will get an opportunity to avail themselves of this facility, which can be called an amenity.

A refresher course has been started for Mistries. This course is designed to give them a good understanding of and thorough grounding in supervising. Such courses will no doubt go a long way in ensuring effective supervision, leading to higher efficiency.

We extend our good wishes to those undergoing the special courses. We are sure that the staff will greatly benefit and that their work will not only be more satisfying but also will enable them to rise higher and higher in their official career.

The inauguration of the Chemicals and Paints Laboratory on the 8th November, 1958 marks another milestone in the progress of our Factory. It will greatly facilitate improvement and control of quality, and location and utilisation of indigenous materials.

Elsewhere in this issue, we publish an article on the trip by children of staff of the I. C. F. to Delhi and Agra for sight-seeing. The highlight of the trip was the meeting of the children with our revered Prime Minister at his residence. Such excursions, besides providing the much needed diversion, are highly educative and help to develop a broad outlook.

Monthly Outturn

	Target figures		Actual figures	
	K.D. coaches	Indigenous coaches	K.D. coaches	Indigenous coaches
November, 1958	...	29	...	33
Cumulative total for the first eight months of the year 1958-1959	30	169	36	209

WHAT IS NEWS AND WHY

Diesel cars to be introduced for short distance rail traffic

Mr. S. V. Ramaswami, Deputy Minister for Railways, stated at Coimbatore on November 7, that steps were being taken to manufacture diesel rail cars in Chittaranjan Loco Works. These cars could be used for short distance traffic which, he said, was now being gradually switched over to road where convenient buses were run.

Mr. Ramaswami was talking to Pressmen at the Coimbatore railway station.

Earlier, accompanied by Mr. S. Chowdry, Divisional Superintendent, Olavakkot, the Deputy Minister paid a visit to the Signal and Telecommunication Workshop at Podanur. The workshop was opened some months ago at a cost of Rs. 25 lakhs to produce signalling and telecommunication equipment for the Southern Railway. There is a proposal to expand the workshop further at a cost of Rs. 6 lakhs. The equipment manufactured here would save foreign exchange to the tune of Rs. 12 lakhs.

Railways and road services

Matters of common interest to the Railways and State Governments were discussed at a conference of State Chief Ministers with the Railway Minister in New Delhi on November 7, 1958.

The Deputy Railway Minister, Mr. Shah Nawaz Khan, and the Chairman and members of the Railway Board and State Government officials were also present.

The Railway Minister referred to the need for devising ways and means of combating the incidence of crime in running trains. He said that although law and order was a State subject, the problem should be tackled through more effective co-ordination and co-operation

between State police authorities and the Railway Security Force. The Chief Ministers said that every possible assistance would be given in tackling this and other allied matters.

References were made at the meeting to the need for new railway lines. The Railway Minister said that there were demands for new lines from every State. He recognised that some areas in the country needed to be opened up. However, the length of new railway lines to be constructed during the Third Plan period would have to depend on the overall size of the Third Plan and the financial resources available. The Railway Minister, he said, was giving its most anxious consideration to the question of opening up undeveloped areas. In this context, the Railway Minister requested the Chief Ministers to consider the question of better co-ordination between the Railways and road services. He said that in the larger national interest, fresh investments in road development should be employed for opening up areas at present not served by the Railways, instead of duplicating existing routes which amounted, in the last analysis, to wastage of national investment.

The Railway Minister also referred to the liberal issue of road permits on sections where railway facilities already existed. The conference agreed with the view that these should be confined to areas where road transport was non-existent or was required as feeder to the Railways. Duplication of services was wasteful and should be avoided, particularly in this case where foreign exchange was involved.

In regard to the construction of new over-bridges and level-crossings, the Railway Minister said that a phased programme would have to be adopted and the Railways would contribute their share of the cost. The State Governments should ensure that the local authorities

concerned were in a position to meet their share of the cost.

Purchase of stores by Railways

Indian railway purchases of stores manufactured within the country have doubled during the seven-year period ending 1956-57. It is estimated that about 60 per cent of the entire engineering capacity in India is geared to meet the requirements of a variety of stores purchased by railways.

The indigenous purchases during 1950-51, the year immediately preceding the First Five-Year Plan, totalled Rs. 63.22 crores. At the end of the First Plan period in 1955-56, the purchases had increased to Rs. 93.65 crores.

During 1956-57, the latest year for which figures are available, the purchases almost touched the all-time record figure of Rs. 126 crores.

Adequate wagons and top priority for coal— Railway Minister assures coal industry

The Union Minister of Railways, Shri Jagjivan Ram, assured the coal industry that highest priority was being given to the transport of coal and that the pit-head stock of coal would not be allowed to accumulate. The Minister gave this assurance to the representatives of the coal industry who met him on October 18, 1958 at the premises of the Indian Colliery Owners' Association, Dhanbad.

Shri Jagjivan Ram said that the pit-head stocks of coal had decreased recently as compared with those of the last year. As against a capacity of 1,685 coal wagons above Mughal Sarai—the target set for the end of the Second Five-Year Plan period—the Eastern Railway was now carrying, on an average daily, 1,750 wagons beyond Mughal Sarai.

The Minister told the representatives of the coal industry that the railways had developed an 'adequate capacity' to move all the coal and raw materials that would be required for

the five steel plants in the eastern region—Burnpur, Tatanagar, Durgapur, Rourkela and Bhilai.

Shri K. B. Mathur, Member, Transportation, Railway Board, told the representatives that the total capacity required by the end of the Second Plan would be 1,050 wagons at the Bengal-Bihar coalfields served by the South Eastern Railway. On account of the heavy construction works undertaken by it for developing transport capacity urgently required for the steel plants, the South Eastern Railway had not been in a position to offer an adequate number of coal wagons. But, as these works were nearing completion, the position was becoming easier and the South Eastern Railway was now offering 1,100 to 1,200 wagons everyday for coal loading in this area. Shri Mathur was confident that the railways would be in a position to meet the demands of the collieries fully.

New line to serve Ranchi plateau

The Eastern Railway's Rs. 14.75 crore project—the 86 mile Chandrapura-Muri-Ranchi-Hathia broad gauge line—is making good progress towards completion. The construction of the Chandrapura-Muri section, which was taken in hand in November, 1957, is now 90 per cent complete so far as the formation and bridgework are concerned.

The construction of the Muri-Ranchi section was taken in hand in July, 1958. Notwithstanding heavy rains this year, it has been possible to complete 25 per cent of the earthwork and 15 per cent of the bridgework. It is expected that all formation and bridgework will be completed by June, 1959 and the line will be ready for traffic by March, 1960, replacing the present 36-mile narrow gauge track built in 1904. The section from Ranchi to Hathia will also be laid about that time.

The Union Minister of Railways, Shri Jagjivan Ram, inspected the work at site on Octo-

ber 20. He said that the construction of this 86-mile track from Chandrapura to Hathia was a stupendous task calling for the building of at least 400 bridges over steep ravines, deep gorges, hilly streams and wide rivers along the hilly ranges of the Chotanagpur plateau.

With the initiation of the Second Five-Year Plan and the setting up of two new steel plants at Rourkela and Bhilai, the necessity for an independent route for transporting coal to the steel plants was recognised and, among the rail facilities proposed during the Plan period, was a line from Barkakana to Rourkela via Ranchi.

The new single-line section, will be one of the busiest on the Indian Railways. By the time the construction is completed upto Bondamunda, the Bokaro steel plant will have been set up and the production at the Rourkela and Bhilai steel plants doubled. There will be heavy traffic in both directions as the line will carry most of the coal required for the Rourkela and the Bhilai steel plants and all iron-ore and limestone for the Bokaro steel plant. The intensity of traffic will be so great that, even with electrification, it will not be possible to run the required number of goods trains of the present normal size and load and it is, therefore, proposed to run trains of 3,000 tons gross load with two electric locomotives each. Even by this means it will just be possible to handle the anticipated traffic on this line. If the traffic increases further, it will be necessary

to run trains of 7,000 tons gross load with four or more electric locomotives. Provision has, therefore, been made for the extension of station yards at intervals of 12 to 15 miles to deal with trains of this length, should it become necessary in future to run such trains.

A total of 32 crore c.ft. of earthwork is to be executed in the formation of the new line between Chandrapur and Hathia and the yard at Dugda. Heavy rock cutting is involved in the ghat section between Muri and Ranchi for which blasting with geelnite is being done. Earth-moving machinery is being used extensively. Embankments up to 50 ft. high and cuttings up to 50 ft. deep have to be provided in the ghat section. In one cutting, for a length of 300 ft., the depth will be as much as 68 ft. out of which 50 ft. will be in solid rock. 400 bridges are being constructed, the most important one being that over the Damodar. The bridge is of 1,110 ft. clear spans, its height above the bed being 70 ft. The bridge has been silted at a place where the river bed is of solid rock and it has been possible to build up the piers and abutments in a period of 6 months only, mainly due to the selection of the site.

The total volume of masonry and concrete in all the bridges is 65 lakh c.ft. There was, till recently, a shortage of cement in the country and to conserve cement, all masonry has been and is being done in stone. This has resulted in the saving of nearly 30,000 tons of cement.

FOR YOUNG OFFICERS

POINTS TO PONDER

BY

P. C. MUKERJEE,

(Chairman, Railway Board)

Based on a talk he delivered some time ago before an audience of young trainee officers at the Baroda Railway Staff College, India's Number One railwayman gives in this article thought-provoking advice to young railway officers on whom will tomorrow fall the burden of running Asia's largest railway system. Shri Mukerjee winds up with this pointed reminder: "The progress of the country depends on the railways; the progress of the railways depends on its young officers."

The young railway officers of today will be called upon to run the vast network of Indian railways in the years to come and to be responsible for their efficient working. In that context, the importance of training institutions like the Baroda Railway Staff College, where officers of all departments have an opportunity of getting together and of developing an appreciation of the nature of work in the different departments can hardly be over-emphasised. This training enables young railway officers to develop a closer understanding of the working of the railway in its various spheres.

After completing over four years of service on the railways, when the author attended a staff college course at the Railway Staff College at Dehra Dun—that was its first course in January, 1930—he realised for the first time the benefits to be obtained by meeting and working closely with men from other departments of the railways.

Railways must look ahead

Two years of the Second Five-Year Plan have passed and preparations are well in hand for the third Plan. It is necessary that we should not only take care of the present but also look ahead as much as 30 or 40 years, if possible. The railways are now thinking in terms of much

heavier goods train loads—as much as 3,200 tons or more because of lack of line capacity in many sections.

The problem of providing couplings of adequate strength for such heavy loads has yet to be solved. Dieselisation and electrification of certain sections is being done for speeding up traffic. Modern methods of signalling, such as colour light signalling, C.T.C. etc., are also being actively pursued.

The vital position of the railways in meeting the country's transport requirements can be judged from the fact that not only today, but probably for many years to come, the railways will have to meet the bulk of these requirements. Alternative modes of transport such as road or riverine transport will not be able to take a sizable share of the country's total needs in the near future. With the limited resources available, the country cannot afford the luxury of building up many alternate forms of transport.

The railways will, therefore, have to plan to carry the bulk of the country's traffic that will be offering in the future.

At present the railways are carrying about 132 million tons of freight traffic annually. For a population of over 360 millions, the

tonnage per head of population is very small compared to countries with higher standards of living. A rise in this figure is inevitable with the progressive industrialisation of the country and improvement in the living standard.

The possible development of nuclear power and its effect on the pattern of traffic movement will have to be borne in mind. With the establishment of nuclear power plants supplying energy at a cheap rate, transport of coal, which is now about 30 per cent of the total traffic, may be reduced considerably, and this may lead to a change in the complexion of our traffic, needing re-orientation of our traffic capacity.

The planning of railways' future development should take all this into account. In all the planning and in the execution involved, the latest developments have to be kept in mind and young officers will have a big part to play in this.

Need for technical-mindedness

With the rapid technical and scientific advances being made in the world and on the railways in particular, it is imperative that the staff employed on the Indian railways are fully trained. In technical matters, India is far behind the advanced countries. To overcome this deficiency, young officers must be technical-minded. Even the so-called non-technical men could and should take interest in technical matters. In fact, no department of the railways can be called "non-technical."

Some years ago, when the railways in the United States were converting some of their locomotives from coal-fired to oil-fired ones, the author was travelling in a train in that country. The guard of the train in which the author was travelling gave him technical details of how this conversion was done and suggested that he should have a look at one such engine. It was very commendable for a non-technical employee like the guard to take so much

interest in a technical matter. If all our railwaymen do likewise and take keen interest in technical developments, the future of the railways will be assured.

In Japan, rapid strides in technical advancement became possible due to the keenness displayed by men in all technical matters.

Getting the best out of men

Better staff relations should exist on the railways, and officers should try to get the best out of their men. This can be done by knowing their men and looking after them. All credit for something well done should not be appropriated by the leader of a team and a good leader should always give his men their due share of credit. An officer will then be able to enlist the unstinted loyalty and devotion of the men working under him.

The author is reminded of a Divisional Superintendent under whom he had worked. This officer made it a point to look after his men in all ways. At a site of an accident, where the men had to work very hard, he personally looked after the comfort of his men. On one occasion the author noticed this officer himself seeing to the preparation of tea for his men. In return, the men under him worked willingly, loyally and diligently.

Every railwayman should welcome the location of more and more industries on his railway as a means of ensuring the future prosperity of the railway and not disfavour or discourage the location of such industries, only because it will mean a little more work for him in providing sidings, etc. In advanced countries, the railways are extremely anxious that new industries are established close to their lines, so as to feed the railways with traffic.

What Officers should guard against

If any one complaining of hard work would examine his work, he would probably find that much of it is due to wasteful paper work. A personal discussion rather than long drawn

out correspondence very often yields quicker results. Unproductive file work should be cut down as much as possible. Office procedure can be rationalised so that jobs of a routine nature are made to conform to a standard resulting in expeditious disposal. An officer should not be reduced to a "file pusher."

There are certain types of work which are in the nature of day-to-day routine and are looked upon as drudgery. It is probably the monotonous nature of such jobs which has earned them this description. Handling machines in workshops, watching the punctuality of trains, seeing to the cleanliness of stations and coaches, trolleying and inspecting the track, perhaps, come under this category and involve a certain amount of tedium. Yet, it is on the efficient performance of this so-called 'drudgery' that the reputation of the railways depends. It is not merely by occasional feats of brilliance, that a railwayman can help to run the railway efficiently.

Officers should, by example and precept, see that there is no room for corruption on the railways and that the moral standards of

railwaymen are kept high. If the railways are to remain the lifeline of the country, honesty and integrity must be cultivated to the highest degree.

Railwaymen have unique opportunity

Railwaymen have the unique opportunity of meeting people all over India and, by the very nature of their work, they are admirably placed for assisting in the task of removing from the face of the country provincial, communal or linguistic bias.

They can build up the tradition of a national spirit and should think of themselves, first, last and always, as Indians, eschewing all prejudices and parochial considerations.

The railways are in a position either to promote or to hamper the country's industrial progress. If sufficient transport is not provided, the country's industrialisation will be crippled. The railways must, therefore, progress at a rapid pace.

The progress of the country depends on the railways; the progress of the railways depends on its young officers.

I.C.F. CHILDREN'S EXCURSION TO DELHI AND AGRA

BY

M. JAYAVELU

(Junior Labour Welfare Inspector)

The children's excursion to Delhi and Agra, the fourth and a very fascinating venture of its kind, was programmed for a week, commencing from the 15th October 1958. The party consisting of 42 children, with a band of seven able and trustworthy guides, led by our popular Welfare Officer, Shri T. D. Jayaram, left Madras by the Grand Trunk Express on the 15th October 1958.

The children kept themselves gay and cheerful during the journey in the delightful company of Shri R. Govindaraj of Millwright Shop, our guide-cum-Piano Accordionist. Charged with a jubilant atmosphere and a high degree of enthusiasm, the children arrived at New Delhi with ease and utmost comfort, on the 17th October 1958, notwithstanding a tedious journey for 48 hours.

No sooner we arrived New Delhi at about 10 a.m. than the children got ready for sight-seeing after finishing their midday meal prepared by our own cook. Thanks to the Northern Railway authorities, a Special De-luxe Staff Bus was provided for the party. We at first went to see the "India Exhibition, 1958." This Exhibition is considered to be the second biggest in the world. Owing to the limited time at our disposal, we had to skip through the different pavilions, but at the same time we were able to give special attention to some of the important pavilions such as Transport and Communication, Defence and Science. We came back to our camp at New Delhi Railway Station at about 9 p.m.

The second day of our camp at Delhi, i.e., the 18th October 1958, was a very busy day for us. In the first lap of our visit we covered the old observatory, popularly known as 'Jantar Mantar,' which was constructed in 1725 A.D. by Raja Jai Singh of Jaipur. This observatory consists of astronomical instruments, constructed in brick and mortar and is a conspicuous monument of scientific and historic value. The observatory consists of a group of six curiously-shaped huge masonry structures, which were designed to study and observe celestial phenomena such as the location and the movements of the sun, the moon and other celestial bodies. With extensive grass lawns all around, the observatory now serves as an ideal place for picnic and recreation.

We then proceeded to the Rashtrapati Bhavan, the official residence of the President of the People's Republic of India. The Rashtrapati Bhavan is an imposing building and stands on an estate 330 acres in area, with 340 rooms. In the centre of the forecourt, facing the building, stands the Jaipur column, while at the back of it a beautiful garden is laid out in the typical Moghul style, where evening parties are now got up for high dignitaries. The children gazed at the portraits of the British Viceroys, Indian martyrs and patriots which were hung at the Rashtrapati Bhavan, with a great deal of interest.

We then stepped into the Central Secretariat buildings which are situated adjacent to the Rashtrapati Bhavan. The Central Secretariat

OXYGEN SERVES THE RAILWAYS

The Indian Railway system is Asia's largest and is a vital factor in the country's development.

The nation's arteries have to be maintained in sound health. Railway engineers rely increasingly on welding for maintenance of the permanent way, bridges, locomotives, wagons and coaches.

Indian Oxygen with its countrywide organisation, serves the Indian Railways in many ways. Besides the supply of industrial gases, welding materials, welding and cutting equipment, this service covers technical advice, tuition and expert assistance in all problems relating to welding and its allied processes.



INDIAN OXYGEN LTD

buildings in New Delhi are believed to be the greatest State Official buildings in the world. Next, we went round Parliament House, an awe-inspiring circular edifice, adorned with an open colonnade half a mile in circumference. The Parliament with its twin chambers, namely, the Lok Sabha and the Rajya Sabha, was inaugurated on the 18th January, 1927. Being future citizens of India, all the children were lost in admiration for the artistic edifice of Parliament House.

On the 18th October 1958 we visited the Shri Lakshmi Narain Temple which is commonly known as 'Birla Mandir.' This was built by Raja Baldeo Dass Birla in 1938 A.D. and is an architectural masterpiece of modern times, depicting a true picture of ancient Hindu culture. In tune with the religious atmosphere of Birla Mandir, all the children spent a considerable time in singing religious and devotional songs.

The same day we visited the 'Jamma Masjid,' which is the biggest and the most beautiful mosque in India. Its foundation stone was laid on the 6th October 1650 A.D. by the Moghul Emperor Shah Jahan and was completed in 1658 A.D. This mosque, built of red stone and white marble, is symbolic of the excellence of Moghul architecture and has a very spacious courtyard of 350 feet square, to accommodate 20,000 worshippers at a time. The children staged a prayerful and serene march into the mosque and drew the attention of the worshippers congregated in the mosque. Late in the evening, we returned to our camp after a delightful cup of tea.

On the 19th October 1958 all the children woke up early in the morning, and after getting neatly dressed, got into the Special De-luxe Staff Bus and advanced towards the residence of our beloved Prime Minister, singing a series of national songs en route and pronouncing "Chacha Nehru—Zindabad," under the able guidance of Shri Shere Dhewan, Senior Labour

Welfare Inspector, Northern Railway. A band of disciplined children, as they were, imbued with marvellous zeal and enthusiasm, they marched into the residence of our revered Prime Minister in an orderly manner and they were extremely lucky to meet him personally at about 8-30 a.m. which was indeed the most momentous event of the venture. This unique meeting with our Prime Minister was greeted with a thrilling chorus by the children to the accompaniment of our Piano Accordionist. The children were received with great warmth and affection quite characteristic of our revered Prime Minister.

We then proceeded to Agra. On reaching Agra at about 2 p.m. on the 19th October 1958, we had an enjoyable and pleasant trip to the Taj in a Special Bus pre-engaged for our exclusive use. The Taj Mahal is the most supreme monument of conjugal love and fidelity in the world, and was built by Shah Jahan in the 17th century to enshrine the mortal remains of his beloved wife, Mumtaz Mahal. The architectural beauty, the exquisite designs and the attractive domes of the Taj, do have the most mysterious fascination and lyrical beauty which have no parallel in any building in the world. The Taj had rightly been described as a 'poem in stone.' On our way back to Agra Station, we had only a glimpse of the Agra Fort, the magnificent palace fortress built by Akbar and later improved by Shah Jahan. As the dusk was fast setting in, we returned to Delhi the same night to complete the remaining items of our itinerary.

On the last day of our camp at Delhi, i.e., on the 20th October 1958, we set out early in the morning in a hectic mood to complete our sight-seeing all round Delhi. At first, we rushed to Raj Ghat, the place where the corpse of Mahatma Gandhi, the Great Good Father of the Nation, was consigned to celestial flames on the 31st January 1948. Raj Ghat had become a hallowed shrine for not merely

the citizens of India but also for foreigners who visit India. The environment is charged with a high spiritual atmosphere quite consistent with the simplicity of thought and catholicity of outlook of the late Mahatmaji. All the children marched round the Samadhi in a very orderly manner and a prayerful mood. Some of us placed floral wreaths on the Samadhi in token of our love and deference to the late Mahatmaji.

After paying homage to the Father of our Nation, we proceeded to the 'Purana Qila,' the ancient Old Fort, which was also known as 'Din Panah.' This was the stronghold which the Moghul Emperor Humayun started in 1530 A.D. and Sher Shah Suri completed in 1541 A.D. This old Fort is, according to tradition, believed to be erected on the site of Indraprastha, the capital city of the Pandavas. The Fort is now habitated mostly by the refugees.

Humayun's Tomb on the Mathura Road was the next venue of our visit. The Tomb of Humayun who died on the 19th January 1556, was raised to a monument in 1565 A.D. by his endearing widow Queen Hamida Bano, who was also interred in one of the chambers of this splendid mausoleum which is a fine piece of Moghul architecture of unparalleled skill in masonry.

The next important place of our visit was the Qutab Minar, which according to tradition, was originally Vijay Stumbh (Tower of Victory) built by the last Hindu King, Prithvi Raj, and was remodelled in 1199 A.D. by Qutab-ud-Din Aibak who dubbed it as Qutab Minar. Qutab Minar is a magnificent specimen of architectural beauty and perfection and is believed to be the tallest tower in the world. This beautiful tower is 238 ft. in height with 47 ft. 3 inches as the basic diameter, while at the top the diameter is 9 ft. only. Inside the tower is a spiral staircase with 379 stone-steps leading to its summit. It was indeed a marvel-

lous piece of adventure for our children to ascend the spiral steps right up to the summit of the tower in batches, each batch consisting of three children and one guide. They never showed any sign of diffidence or nervousness in the course of this enterprise. After descending from the tower, they spent quite a nice time in subdued music and delightful dancing which attracted the attention of many visitors there.

We then visited Okhla, which is an ideal picnic resort for week-end picnic parties including tourists. Okhla has the additional charm of being on the banks of the Jumna with a newly built Children's Park. Okhla is the headworks opened in March 1874 from where Agra Canal takes off from the river Jumna. After spending a few peaceful minutes on the bank of the river, we went to see the massive Red Fort which is so called for the colour of its exterior. As we had to race against time, we could not go into the interior of the Fort.

The Red Fort was the most magnificent royal palace of Shah Jahan who built the Fort from 1639 to 1648 A.D. It was at the top of the Red Fort that our Prime Minister had the proud privilege of unfurling the tri-colour Indian National Flag on the 15th August 1947.

After shopping for a while at Chandni Chowk, the main bazaar at Delhi, we rushed back to New Delhi Railway Station viz., Connaught Place, the most fashionable central shopping place at New Delhi, and boarded the special carriage for our return trip. All the children were busily engaged in jotting down notes of the visits they paid in Delhi and Agra, and in rearranging their personal effects.

The children were no less happy on their return trip. They were immersed constantly in fun and frolic, and were in good cheer and high spirit right through their journey till their arrival at Madras Central.

WEDDING BELLS



Our hearty felicitations to Shri A.V. Manickam, Welder Apprentice, and Kumari V. Suseela, daughter of Shri Veeramuthu, who were married on the 28th November, 1958.

TOWARDS BETTER TEACHING

BY

S. SREENIVASAN

(Instructor, Technical Training School)

You are preparing to become a teacher of an industrial subject—specially to teach others the skills and the information of your own occupation. The first thing that is needed in such a task is to have at hand, in written form, a catalogue of skills and facts which comprise the content of your occupation, the occupation you wish to teach. This you will undoubtedly have, in the form of a trade or occupational analysis.

The fact that you know what to teach and that you are a master of your own occupation provides no assurance that you will be successful in attempting to teach it to others. In order to teach others what you know or what you can do, it is necessary to be familiar with and know how to use a great many materials, techniques and ideas and special skills which are often referred to as teaching methods. Although you may know what to teach you will need to learn how to teach. This in no way reflects your skill or knowledge in your own occupation. It merely means that you are preparing for a new occupation, that of teaching, and need instructions and assistance as an apprentice teacher, just as you have received instructions and assistance as an apprentice in your own trade.

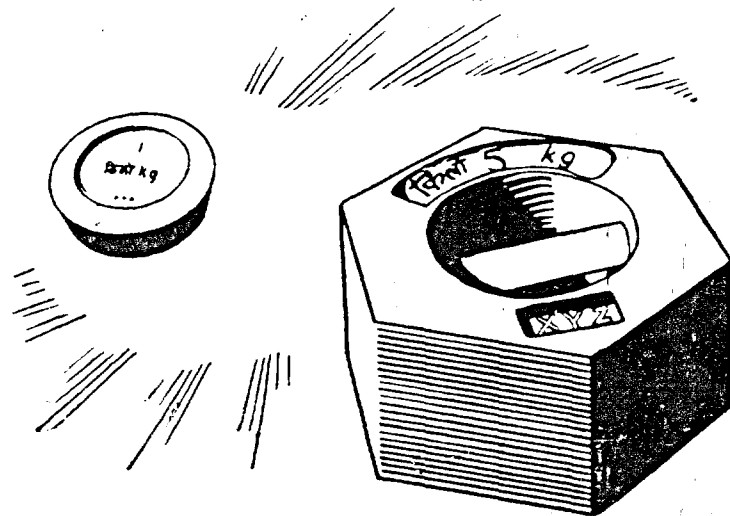
This article deals in short with the methods which a teacher of an industrial subject must learn to use if he is to have reasonable success in teaching others. To do this, it will be better if he had undergone courses in psychology for industrial teachers, principles and problems of vocational education, and trading or occupational analysis.

Teaching and Learning : It is often taken for granted that a person who knows the subject very well is at once prepared to teach it to others. A man who has become a highly skilled mechanic, for example, may feel that he can readily instruct others in the skills of his trade by showing the learners how he does the work and by explaining to them the ideas and the purpose which are involved. It is only after he attempts to teach in this way and discuss how little his pupils have learned that he realises the need for a better understanding of how learning takes place.

A teacher soon finds that in order to have his pupils learn what he teaches them, there are certain things which he himself must do in a certain way and that there are other things which the learners must do. He finds that he must carefully plan his own activities and those of the learners. These ways and means of teaching are known as teaching methods. The teacher cannot select these methods at random if his teaching is to be successful, but he will not know which methods to select or how to use them unless he first understands what is happening to the learner when the methods are used. This is to say, the teacher must first know how the learner learns. It is only when the pupil is engaged in putting into practice what he has seen, heard, and read that the learning process becomes complete.

It should thus be clear that teaching is simply helping other persons to learn. The teacher plans to make the learners experience so that this experience may lead as quickly and directly as possible to a mastery of the desired skill and knowledge. The teacher

First Phase



The first phase of the change-over to the Metric System of Weights and Measures began on October 1, 1958. The use of Metric weights has become legal in selected areas of the States.

The Metric System has been introduced also in Government departments and industries like cotton textile, iron and steel, engineering, heavy chemicals, paper, cement and jute.

The reform will be gradually extended till the whole country is covered.

METRIC SYSTEM

for
simplicity and uniformity

KNOW THE
METRIC
EQUIVALENTS
OF THE PRESENT
WEIGHTS

Issued by the Government of India

METRIC WEIGHTS : Conversion Table
(Cut and Keep For Use)

PALAMS	GRAMS	VISS (1 Viss = 40 Palams)	KILOGRAMS	GRAMS
1	35	1	1	— 400
2	70	2	2	— 800
3	105	3	4	— 200
4	140	4	5	— 600
5	175	5	7	— —
6	210	6	8	— 400
7	245	7	9	— 800
8	280	MAUNDS (1 Maund = 8 Viss)	KILOGRAMS	GRAMS
9	315			
10	350	1	11	— 200
11	385	2	22	— 400
12	420	3	33	— 600
13	455	4	44	— 800
14	490	5	56	— —
15	525	6	67	— 200
16	560	7	78	— 400
17	595	8	89	— 600
18	630	9	100	— 800
19	665	10	112	— —
20	700	11	123	— 200
21	735	12	134	— 400
22	770	13	145	— 600
23	805	14	156	— 800
24	840	15	168	— —
25	875	16	179	— 200
26	910	17	190	— 300
27	945	18	201	— 500
28	980	19	212	— 700
29	1015	CANDY (1 Candy = 20 Maunds)	KILOGRAMS (To nearest Kilogram)	
30	1050			
31	1085	1	224	
32	1120	2	448	
33	1155	3	672	
34	1190	4	896	
35	1225	5	1120	
36	1260			
37	1295			
38	1330			
39	1365			

1 KILOGRAM = 1,000 GRAMS

DA 58/247

then guides the learner through these planned experiences so that he makes steady progress in perfecting the skills or making the pupils understand the ideas that are being taught. Here are some principles of learning for your guidance :

- (1) We learn best when we are ready to learn.
- (2) The more often we use what we have learnt, the better we can understand it and utilise the knowledge thus obtained.
- (3) Teaching something new is made easier if learning can be built upon something we already know.
- (4) Learning has to be accomplished step by step.
- (5) Learning takes place by doing.

The Lesson and its Content : The teacher of an industrial subject makes a careful analysis of his trade or industrial occupation in order to secure a catalogue of the skills and knowledge which are to be taught. The question now arises as to how much of the total amount should be taught at one time. What skills should be presented in one demonstration? What items of trade theory should be selected for a single presentation?

The material selected by the teacher for a single presentation to the learner is known as a lesson. The skills chosen to be demonstrated in a single demonstration constitute a skill lesson. The items of trade theory selected for a single presentation may be called a theory lesson. The teacher of course, in planning to teach a lesson, needs to know how to go about selecting the proper items to be included in the lesson. Much of his success or failure in "putting the lesson across" depends upon his selection of these items.

Selecting the Lesson Content : There are a few dependable rules which will guide the teacher as he attempts to decide exactly what

to include in a given lesson and what to leave for another lesson. Some of them are :

- (1) As a beginning towards preparing the lesson, it is well to write down the objectives of the lesson. These are short sections listing what the teacher plans to have the learner accomplish in the lesson. Material for a lesson should be chosen and revised until the objectives which are described in it indicate unity in the lesson.
- (2) If more than four or five closely related objectives are required to describe what the lesson is to include, it is probable that the lesson will be too long. In this case the lesson should be shortened by reducing the number of objectives and the lesson content, leaving some of the material for another lesson.
- (3) Another measure of the amount of material to be included in one lesson is the amount of time which will be required to demonstrate the skills or present the information.
- (4) If only one or two objectives will serve to cover the lesson content, the lesson may be too short. A lesson which is too short usually fails to maintain the learner's interest.
- (5) A good lesson will begin with some of the key points covered in the previous lesson and lead into new elements which have never been covered before.

Teaching steps : After the content of the lesson has been decided upon, the teacher may begin to plan in some detail, first how best he can "put the lesson across." Although methods and materials will vary for each lesson, there is a well-tried pattern around which every lesson can be planned and taught. This pattern consists of four steps.

- (1) The preparation step—
 - (a) Preparation by the teacher
 - (b) Preparation by the learner to receive the instruction
- (2) The presentation step
- (3) The application step
- (4) The testing step

1. *Preparation step :* It will be observed that the preparation step consists of two parts. The first part is—

- (a) Deciding how each part of the lesson will be carried out (methods)
- (b) Deciding upon all teaching materials needed
- (c) Seeing or preparing timely and familiar examples and arranging for their use at the right time as the lesson develops.

The second part is—

- (a) Choice of class room, shop or area in the shop where the lesson will be presented.
- (b) Arrangements for proper ventilation and lighting.
- (c) Selection of work stations to which pupils will be assigned after the lesson has been presented.
- (d) Provision for tools and equipments for pupils' use.
- (e) Provision of charts, diagrams, films, slides and other teaching aids.
- (f) Provision for instruction sheets and working drawings for pupils where necessary.

2. *Presentation step :* During this stage of the lesson, the teacher shows the learner how to perform the skill in which he seeks

proficiency or he makes clear to the learner the facts, ideas and relationships which constitute the theory which the learner seeks to understand. There are several methods by which the skills can be presented to the learner well and there are many methods for presenting information so that it can be readily learned.

3. *Application step :* The application step provides the best opportunity for learning by doing. This step may be considered as the most important of the four teaching steps. No learning can take place without it. It is only by passing through the experience involved in these attempts that mastery over the skills and information can be achieved.

4. *Testing step :* The testing step is one which is too often either neglected entirely or poorly handled by the teacher. Nevertheless it is a vital step in successful teaching. One reason why the testing step is so frequently given less consideration by teachers than it deserves, is that many teachers fail to understand the various purposes for which tests are used. The purpose of the testing step is simply to help both the learner and teacher determine whether the objectives of the lessons have been achieved. The other steps of the lesson may be well-planned by the teacher and well-executed by both teacher and learner, so far as they are aware, until the results are checked. The purpose of every lesson is to have the learner master some new skill or knowledge. Whether this mastery has resulted from the activities of the lesson can never be known, unless a testing step is employed to check the results. If the testing step is introduced in its true relationship to the learning procedure, the learner will come to look upon it as a welcome aid in his own efforts toward achieving the goals of the lesson.

MARCH OF SCIENCE

DEVELOPMENT OF INDIA'S STEEL AND ENGINEERING INDUSTRY

National Metallurgical Laboratory's Significant Contribution

Every Sunday evening, thousands of visitors to the "India—1958" Exhibition in New Delhi get an opportunity to watch one of the most modern processes of manufacturing steel at a Pilot Plant, set up just outside the Science Pavilion by the National Metallurgical Laboratory, one of the chains of 21 laboratories built up in India during the last one decade.

Few of the people who watch the seven-foot high tongue of brownish-white flame as it leaps out of the mouth of the miniature steel converter know that it is this process,

known as the L.D. process, which will be used for the first time at the Rourkela Steel Plant—one of India's three big new steel projects. The Second Five-Year Plan has a target of producing 750 thousand tons of steel by this new process, which is both cheaper and faster than the traditional method and better suited to the needs of India's rapidly developing steel industry.

Pilot plant investigations on the new process are continuing at the National Metallurgical Laboratory at Jamshedpur and are expected

to yield valuable data not only on the properties of Indian pig irons but also on the suitability and performance of India-made basic refractories for use in oxygen steel converters.

Utilisation of Indigenous Resources

This Laboratory, situated at Jamshedpur, is the sixth in the chain of national laboratories set up by the Council of Scientific and Industrial Research. The decision to have an organised metallurgical research laboratory was in keeping with the objectives of the Government to have a planned industrial development directed towards expansion and effective utilisation of the country's resources in metals and minerals.

Since its inception, the National Metallurgical Laboratory has directed its efforts towards developing substitute alloys both in ferrous and non-ferrous fields, which are not merely replicas of foreign products but are based on indigenous alloying elements. The purpose is to meet the needs of Indian engineering and other industries mainly by locally available materials.

Apart from the example of the L.D. process of steel making, another significant contribution by the Laboratory is the construction of a low shaft furnace pilot plant of 15 tons per day capacity. It is now nearing completion and is expected to produce different grades of pig iron, using sub-standard iron ores and non-metallurgical coal or carbonised lignite, plentiful supplies of which are available in India but are unsuitable for smelting in a conventional blast furnace.

Work at the Laboratory has also contributed to the development of nickel-free stainless steels and nickel-free coinage alloys as well as production of electrolytic manganese and manganese dioxide on a substantial scale.

The development of nickel-free austenitic stainless steels based on indigenous elements, such as chromium, manganese, nitrogen and

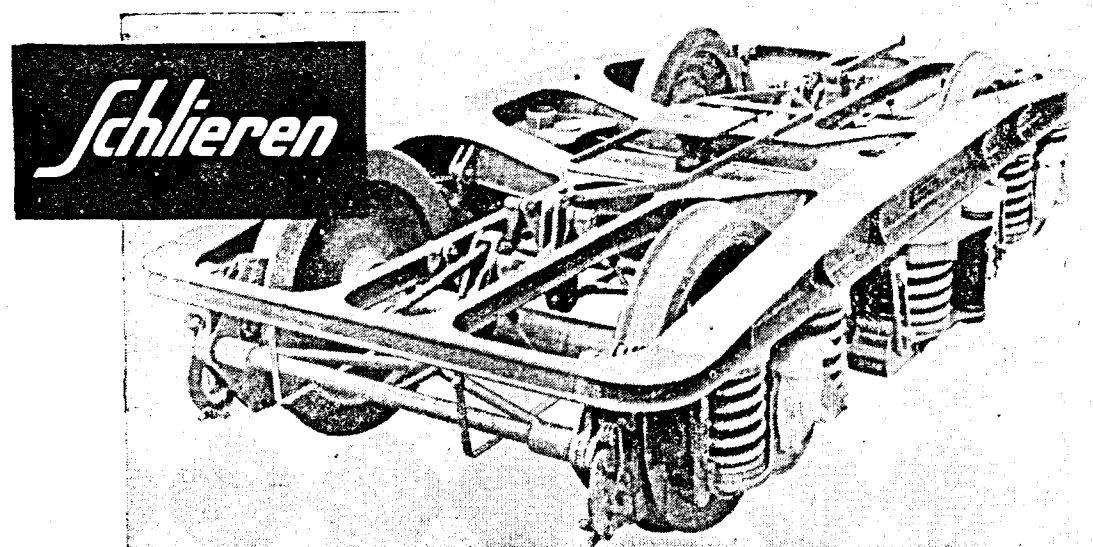
copper besides incorporating rare earth elements becomes significant in view of the fact that India has no indigenous sources of nickel and has been recently importing several thousand tons of nickel-bearing stainless steel a year, valued at several crores of rupees. These substitute nickel free stainless steels can successfully replace the conventional chromium-nickel steel in specific applications and can be used for all kinds of domestic utensils, for railway fittings and many other purposes.

Significant progress has also been made in some of the industrial projects initiated by this Laboratory which are now being translated into pilot plant scales. Among the new methods developed at the Laboratory are those for the production of electrolytic manganese metal, electrolytic manganese dioxide and refractories.

Collaboration with Industry

The Laboratory has been working in close collaboration with other bodies connected with metallurgy or metal industry such as the Indian Bureau of Mines, the Atomic Energy Establishment, the Metals Research Committee and the Railway Board. For their benefit, it has undertaken such projects as projects of uranium ores, manganese and chrome ores, low-shaft furnace project, and projects for the development of tinless bronzes and controlled friction materials, besides furnishing them with useful technical data. The Laboratory has also made some useful contribution to the Indian Standards Institution by helping it in the formulation of standard specifications on foundry sands, facing materials, methods of sampling foundry sands and manganese ores and methods of chemical analysis.

The Laboratory has been paying particular attention to the problems and requirements of the small-scale metallurgical industries. It undertakes special research for their benefit and holds demonstrations of small-scale pro-



**Bogie
Type SCHLIEREN
for sleeping
cars**

Bogies of this type developed by SCHLIEREN have been chosen by the Compagnie Internationale des Wagons-Lits for their latest sleeping cars because of their outstanding riding qualities, soft springing and smooth running under all conditions, even at high speeds (tested up to a speed of 100 m/h).

Tare weight: 5.7 tons
Wheel base: 2500 mm (8' - 2 1/2")
Helical springs

Swiss Car and Elevator Manufacturing Corp., Ltd., Schlieren-Zurich (Switzerland)

duction techniques. Recently, for the small-scale electroplating industry, it held a special demonstration of four new processes of electroplating on aluminium.

The Laboratory maintains a close liaison with the industry. For disseminating to the industries the results of research carried out at the Laboratory, besides for demonstrations of pilot plant scale processes, frequent symposia are held on metallurgical and allied subjects. A recent symposium, which proved very popular with both scientists and industrialists, dealt with the latest developments in Foundry Technology.

Model of Human Cell gives New Insight on body

A glowing tangle of tubes, globes and a variety of other weird shapes, large enough to hold 40 people in a dome-like interior, recently gave New Yorkers their first "inside" look at a human cell—the germ's eye-view of life.

This giant three-dimensional model of a cell, one million times larger than an actual red blood cell in the body, was one of the top features of the New York Health Show, sponsored by the city's health department.

Designed for The Upjohn Company of Kalamazoo, Michigan, a major pharmaceutical manufacturer, the cell model was constructed with the guidance of a group of the nation's leading cytologists—cell specialists. Measuring 24 feet in diameter and 12 feet high, the model incorporates all the most recent discoveries about cell organisation and chemistry. It also provides, for the first time, an overall view of the key internal structures of the cell, which is the basic unit of all life, in proportionate sizes to one another.

Within the huge model itself, spectators can view in perspective the nucleus or "heart" of the cell containing the chromosomes that carry hereditary characteristics; the special unit involved in formation of vital proteins; the sputnik-like centrosome which plays a

primary role in cell division; the centre where nutrients are transformed into energy; and balloon-like fat globules where energy "fuel" is stored.

Almost a mile of special plastic tubing, a mile of electric wiring and a large variety of custom-made plastic structures were used during the year of planning and construction work on the cell. Lit from within by a hidden series of undulating blue lights, the cell seems to "pulse" and glow with the appearance of life.

"Within this new picture of the cell," commented Dr. A. G. McLeod, the company's scientific co-ordinator for the project, "it is now possible to understand quickly some of the fundamental 'facts of life.'" "We believe," he said, "that the construction of the model is of particular importance since the cell is the most basic aspect of living things. It is where disease strikes and where our drugs act. It is so minute that it takes about 1,000,000,000,000 cells to make a single adult body. The cell is the building block of which all animal and plant life is constructed and the more we learn about it, the more basic will be our knowledge of diseases and their alleviation. We hope this model will make a contribution to increasing this understanding."

According to Will Burtin, the cell's designer, only a model of such proportions could show the structures in the cell in proper scale. Burtin also asserted that construction of the cell represents a pioneering effort in relaying difficult and complex ideas to both the scientist and layman. He said, "This kind of three-dimensional visualisation of a structure that no one has seen in total, but that is inferred from many kinds of evidence, may prove to be an important answer to the problem of communicating scientific information in a world that frequently moves too quickly for orthodox educational methods."

New Technique to Relay Physiological Data

A new achievement which would permit physiological information to be transmitted over long distances by radio or telephone has been developed at the U.S. Naval Medical Research Institute at Bethesda, Maryland. Such information as heartbeat, breath sound, spoken words and other measurements of the physical condition of humans or animals can be transmitted from isolated areas to Bethesda.

This is accomplished by using the electrical impulses generated in the body and by converting other measurements such as body temperature and respiratory volume into electrical equivalents. The electrical phenomena are taken from the body through electrodes. These and the electrical equivalents of other measurements are amplified and the impulses are then transmitted over radio or telephone circuits to Bethesda, where the signal is converted back to the original form it had in the subject's body. It is then portrayed on oscilloscopes, direct writers, and audio systems. At the same time the data are recorded on magnetic tape to provide a permanent record.

Through this system it will also be possible to obtain the measurements of the physical condition of the future animal and human occupants of space vehicles. Information could be relayed from pick up stations in remote parts of the world to the Bethesda station over the U.S. Navy's world wide communications network and over radio and telephone circuits.

Bones of Human Skeleton are Dynamic, Not Inert

Once considered to be altogether inert, the human skeleton has recently been shown to be subject to continual turnover, just as are other body tissues, such as skin.

Bone, it is now known, is continually wearing out and being replaced in the normal human skeleton. This turnover of bone and the active formation of new bone in the normal adult skeleton has now been demonstrated by investigators to be much more extensive than previously supposed. Using a new technique for handling radio-active calcium data, devised in laboratories of the U.S. National Institute of Arthritis and Metabolic Diseases, these scientists have demonstrated that the predominant mechanism, in both the adult and growing skeleton, is actual physical destruction of structural bone units and their replacement by new bone formation. Normal adult bone formation, they found, results in the deposition of approximately 600 milligrams of calcium daily, an amount approximating the average daily dietary intake of the mineral.

An unusual and interesting finding in this connection was in relation to patients with osteoporosis, a disease in which the bones become gradually thinner and more brittle and which occurs primarily in the aged and in post-menopausal women. Consistently in five patients the bone formation rates were found to be normal, an observation contrary to the generally accepted idea that this disorder is due to diminished bone formation. The study indicates that osteoporosis may actually be due to increased bone destruction and indicate the need for additional intake of dietary calcium—as in milk and milk products.

GOOD HEALTH IS MAN'S BIRTHRIGHT

(Continued from the November '58 issue)

BY

DR. A. RAMDAS,

(Divisional Medical Officer, Southern Railway)

In the last issue of RAILCOACH I discussed whether doctors and medicines are necessary to help us attain good health. Doctors and medicines alone cannot give us health. The way we live, work and rest are as important for a healthy life as medicines. I shall now discuss under the following headings how good health can be achieved and maintained :

- A. Promotion of health.
- B. Prevention of disease.
- C. Cure of sickness.

(A) Promotion of Health

By Promotion of Health I mean elevation of one's state of health to such a level as to leave a sizable surplus for meeting the challenge of ill-health. I shall now tell you how one can achieve a surplus of health.

1. *The constitution one inherits* : At birth each of us inherits a body which is a part of us till we die. A baby is conceived through fusion of a sperm (male element) and the ovum (female element) in the mother's womb. These elements from the parents carry in their minute constituent parts, various bodily and mental traits of the respective partners. The offspring which results from the fusion of these, naturally inherits some of the parents' traits in accordance with the Mendelian and other laws of inheritance. Thus, a healthy and robust constitution is inherited. Mental traits are inherited. The tendency to develop some diseases like diabetes, cancer and mental disease are inherited. We now see what an important part heredity plays in giving us

healthy bodies and minds. Judicious control over selection of life-mates can therefore go a long way towards producing a healthy nation. But achievement of this is not always within realms of possibility unlike what obtains in animal breeding. The soul of mankind from time immemorial has abhorred regimentation in this matter. But discretion on the part of men and women seeking their mates would certainly contribute to achievement of good health by their offspring. With rising educational standards and advancing age of marriage in our country, we should in the not too distant future be practising scientific matrimony within civilised bounds.

2. *The food we eat* : Without food the body cannot live. Food includes water for practical purposes. A great part of ill-health is due to faulty eating. Overeating causes indigestion, obesity and other diseases. Under-eating causes malnutrition and renders the body vulnerable to infection. 'Eat to live' is sound advice, and eat only if you feel hungry. Duly eating at fixed hours, ceremonial eating at parties and eating without being really hungry when we see appetising food are bad for health.

The cleanliness of the food we eat, comes next. Food must be clean and wholesome. Attractively served food from public eating houses usually comes out of unclean kitchens. Unclean food is a vehicle for various diseases. Eat as little food as possible outside your own home. A plate of rice and sambar prepared at home is worth degchies of appetising pulavs procured from outside !

The composition of the food we eat is equally important. Chemically, food consists of carbohydrates, fats, proteins, minerals and vitamins. These are required to be present in food in certain proportions for maintaining health. A proper proportion of each in diet makes it 'balanced.' In lay language, foods are classified into cereals, pulses, animal foods, fats and oils, vegetables, beverages, sugar and salt.

Carbohydrates occur in cereals which include rice, wheat, barley and oats. These constitute the bulk of food. Each of these contains mostly starch but in varying quantities per grain. Starch is chemically a carbohydrate which is the chief source of energy or calories in food. Carbohydrate absorbed into the blood from the intestines is converted into complex body-sugars, which are physiologically 'burnt' to liberate energy required for bodily activity. Excessive consumption of carbohydrates in elderly people or people pursuing sedentary occupations, taxes the sugar utilising mechanism of the body, resulting in development of diabetes mellitus. It is, therefore, not good to consume large quantities of starch. Rice among cereals contains a large quantity of starch per grain. Wheat contains less. But rice is more easily digestible than wheat. A judicious combination of both is better than either of them alone. A mixed diet of cereals is therefore healthy.

Fats are oily substances of vegetable or animal origin. Coconut, gingelly and groundnut oils and ghee are examples. Fats are a rich source of energy, supplying more calories per gram than carbohydrates or proteins. Fats also carry vitamins with them. Fats are thus valuable as foodstuffs. But fats have some drawbacks. They are difficult to digest. Excessive consumption upsets digestion, besides leading to excessive fat break-up products in the blood. These products in the long-run lead to obesity and degeneration of

arteries causing high blood pressure and heart disease. Judicious use of fats is therefore necessary. Vegetable fats are less nourishing than animal fats but are safer from the point of view of health.

Proteins mainly go to form the brick and mortar of the body, namely the cells. Deficiency of protein in food leads to wasting of the body and weakness. But excessive intake of proteins throws a strain on the waste-eliminating apparatus of the body as the end products of protein utilisation are poisonous and have to be excreted from the body in urine and other discharges. Foods containing animal and vegetable proteins are available. Meat, eggs and milk are sources of animal proteins. Pulses are the chief source of vegetable protein. Animal proteins are more nutritious than vegetable proteins but throw greater strain on the excretory organs of the body. A judicious combination of animal and vegetable proteins must be taken to maintain health.

Minerals in food are mostly utilised for building and maintaining the framework round which the body is constructed namely the bony skeleton. Minerals also form vital chemical compounds in circulating blood which are responsible for maintenance of the delicate and dynamic chemical reactions that control bodily processes. Deficiency of minerals will weaken the strength of bones and teeth and upset the chemical reactions taking place in the blood and other tissues. The chief minerals in the human body are calcium, potassium, phosphorus, iron, manganese and iodine. These are contained in a variety of foods that are commonly eaten.

Vitamins are usually associated by lay people with good health. They are extremely potent substances which are effective in minute quantities and the deficiency of which leads to serious diseases of malnutrition. Vitamins are found in abundance in almost all food in

its natural state, but are despoiled by our methods of its preparation and preservation. Simple methods of preparation preserve the vitamin content. If one takes good food, there is no need to swallow artificial vitamins in the shape of multi-vitamin pills which are religiously consumed by many sophisticated people. The need for regular consumption of artificial vitamins is an acknowledgment of the bankruptcy of discretion of the consumer in the matter of selection of food and its preparation.

The other less important but yet needed constituent of food is roughage. This is the indigestible fibre of vegetable foods and fruits. Roughage furnishes 'substance' to the body of the diet and is required for smooth evacuation of the bowels.

Water is the chief constituent of the body. Deprived of water, the body will wilt and die. Blood which is the transport system of the body for carrying food to its different parts and for taking away the waste products for disposal consists chiefly of water. Water is also the chief constituent of the cells, the brick and mortar of the body. If water intake of the body is inadequate, the transport system gets clogged, resulting in lack of food supply and efficient disposal of waste products.

Under certain conditions if excessively ingested it may also disrupt bodily processes. When it contains harmful chemicals like calcium and sulphate, as some unwholesome natural waters do, it may dislocate normal working of the body.

Finally, food can be a dangerous vehicle for carrying harmful germs into the body. To prevent such entry, the intestinal passage is provided with many sentries. The saliva or spit in the mouth, the oft-removed tonsils, the acid juice of the stomach and the much-maligned appendix in the abdomen are such sentries. They normally keep a protective watch over the Trojan Horse that food is. But a few "Greeks" do sneak in and cause havoc. So, one must take care to eat clean and uncontaminated food. Food can be contaminated by dust, flies and the hands of the food handler (food processor or the cook). Chances of contamination are greater when a number of people handle food during its preparation. The dangers of indiscriminate eating in public eating houses will now be appreciated.

Food eaten wisely is life sustaining. Unwise eating may be lethal. Food is not to be considered merely as a thing one has to consume daily without knowing what it contains and how it is prepared.

(To be continued)

LECTURES FOR SUPERVISORY STAFF OF THE INTEGRAL COACH FACTORY

On October 13, 1958, Shri K. Swarup, Chief Administrative Officer, inaugurated a refresher course for the benefit of supervisory staff of the Integral Coach Factory.

Shri K. Swarup congratulated the supervisory staff on their performance in the 3rd production year. He said that the target of 300 coach shells had been exceeded by the production of 308 shells and that everyone could be proud of such a laudable performance. He added that, however, the 4th production year called upon the supervisors to shoulder much heavier responsibility in having to produce an increased number of shells viz., 400 and also to expand the activity in the Furnishing Annexe. The Chief Administrative Officer expressed his confidence over the capabilities of the I.C.F. team and said that the heavy odds could be met only by furthering the team spirit and by wholehearted loyalty and devotion to duty.

The Chief Administrative Officer explained the circumstances that led to the institution of the series of lectures to be delivered by the officers of the factory. The main responsibility of a good administrator was to provide opportunities that would produce

future leaders of men and this was a start in that direction.

This effort on the part of the Administration could be augmented, the Chief Administrative Officer continued, by the supervisors holding weekly group discussions in which they could exchange views on the various methods of achieving economy and efficiency. Such discussions were apt to lead to improvements progressively. The Chief Administrative Officer thought that visits to other leading factories, having similar or allied processes of production, might be useful.

In conclusion, the Chief Administrative Officer said that apart from encouraging such co-operative discussion and deliberations, the supervisors should also develop better human relationship in properly moulding their approach to the problems and needs of the men they control. This, he felt, would lead to a better understanding of one another's outlook on every subject of common interest and thus ensure laudable results. He even felt that a local bulletin could be published by the Foreman of each shop to highlight their achievements from time to time in order to create lasting interest and enthusiasm.

NEWS FROM SWITZERLAND

(Published through the kind courtesy of the Consulate-General of Switzerland, Bombay).

A Streetcar named "Honesty"

"In Berne, I found a streetcar named 'Honesty,' one foreign visitor to Switzerland's capital enthusiastically recalled recently. When using one of the city's streetcars, he suddenly realized that he was short of small change except for one 10 Swiss cents coin. The fare was 30 Swiss cents, and the conductor was unable to change the 100 francs bill presented by the passenger who apologized in resignation and was about to leave the car. "Don't worry," the conductor said, "you give me these 100 francs, and you'll get your change at the counter of the Main Station stop." The tourist thought that this experiment was well worth 100 francs, and agreed. Late in the evening, he eventually remembered the money due to him. "You are coming late," the benign counter clerk told him, "one more minute, and we would have broadcast a message: 'Wanted foreigner with bloodbeard, to whom the Berne Tramway Company owes 99.70 Swiss francs.'"

Swiss Universal Clocks

A universal clock is a clock showing what time it is at a given moment in any part of the world, either on one or on several dials. These clocks are particularly suitable for airports,

railway stations, ports, travel agencies, etc. A clock of this kind was to be found in the Swiss Pavilion at the World's Fair in Brussels; one is operating at the Kloten-Zurich airport, another at the airport of Geneva-Cointrin. They are made by a firm in Neuchatel and are in the shape of a vast decorative planisphere, on which ten dials show simultaneously the time in ten big cities in various parts of the world.

"Overcrowding" of the Lake of Zurich

Although the Lake of Zurich is slightly "overpeopled" by swans, the City of Zurich will refrain from killing some of these birds which, together with the sea gulls, have become living emblems of Zurich, city officials announced here recently in reply to some obviously unfounded rumours in the local press. Six grown up Zurich swans recently were "exiled" to swan-less Lake Hallwil, north of Lake Lucerne, where they are expected to develop into a prosperous colony. The pioneering birds have been deprived of their wing-feathers to prevent their return in case of nostalgia; the feathers will grow again within a year's period, it is assured. By that time, the "naturalization" of the birds is hoped to be complete.

INAUGURATION OF THE I.C.F. LABORATORY

A simple ceremony marked the opening of a Paint and Chemicals Laboratory for the I.C.F. at the Technical Training School. Shri K. Swarup, our C.A.O.(R), inaugurated the Laboratory formally on the 8th November '58.

The Physical Testing Unit is already furnished with tensile, impact and hardness testers. The other sections as Metallography and X-ray with dark room arrangements shall start shortly. All these sections are being equipped with modern equipments.

In the Paints Section, the performance and serviceability of paints can be evaluated in a shorter time by the humidity chest, weatherometer and salt spray cabinets by accelerated testing, besides the long time exposure testing natural weather. The efficiency of paint film can better be ascertained by glossmeter, tintometer etc.

Some paints of the Epoxy type, rubber base type for panelling, and bituminous emulsions for painting the interior of coaches are already on test. The scheme of painting is at present closely studied to evaluate and improve the performance of painting on the interior of coaches.

The Chemical section will be furnished with carbon and sulphur determinators for quick estimation of carbon and sulphur. Besides, it will be able to help and control electroplating and anodising and to solve problems on conservation of water and on the furnishing side of coaches.

Besides the above, when all sections of the Laboratory are fully equipped, facilities will be available to test panelling, insulation, rubber, plastics etc.

(Continued on page 30)



The Chief Administrative Officer, Shri K. Swarup, going round the I.C.F. Laboratory.

UNIVERSAL CHILDREN'S DAY IN I.C.F.

Universal Children's Day was celebrated in the I.C.F. Colony Aided Elementary School at Ayanavaram with great eclat on 13-11-58. The children assembled at the school at 8-00 a.m. gaily dressed and a procession was conducted accompanied by the band of the Security Force of the I.C.F. and a large number of parents.

Articles of handicraft done by the children were kept in an exhibition which was thrown open to the public. The articles were of varied designs, types and groups, vividly expressing the tastes, talents and capacities of the children. After distribution of sweets to the children, the morning function came to a close by 10-30 a.m.

The function in the evening, largely attended by the residents of the colony, took place in the I.C.F. Institute, presided over by Shri S. Jaya-

ram Pillai, B.A., L.T., Headmaster, Singaram Pillai High School, Villivakkam. In his opening speech, the Headmaster brought home to the young minds of the children assembled, the sterling qualities of our beloved Prime Minister, whose birthday was being commemorated. He also impressed on them the great Gandhian ideal of speaking the truth always. Prizes were distributed to the winners at the handicrafts exhibition.

Then some educative and entertaining films were exhibited to the children. One of these depicted the amenities afforded to the children in the United States and showed how the atmosphere in the schools in America tended to create love and affection among children and how self-effort was encouraged there and how the children are made to realise their duties towards their country.

INAUGURATION OF THE I.C.F. LABORATORY

(Continued from page 29)

With the existing facilities, some control of quality of welding, forging and heat-treatment is being exercised. Problems of investigational nature as weldability of High Speed tool steels, Die Block, Milling Cutter have been tackled. Besides, our efforts at location, evolution and obtaining suitable indigenous substitutes for Axle Boxes, Helical Springs and materials

like glue, plastic and Matrix Alloys etc., are already becoming successful.

With the full growth of this section, it is aspired that this will become a valuable service unit, helping improvement and control of quality and location and utilisation of indigenous materials.

OPENING OF NEW OFFICE PREMISES FOR DEPOT STORES

On the 28th November, 1958, the new building for housing the staff of the D.C.O.S./Depot was declared open at a formal function by Shri K. Swarup, Chief Administrative Officer. The function was presided over by the Deputy Controller of Stores, Shri R. K. Tandon.

Welcoming the Chief Administrative Officer, the President and the guests of the evening, Shri T. S. Jayaraman, D.C.O.S., traced the various stages which led to the opening of the building. Simultaneous with the opening of the new offices, a portrait of Shri Jawaharlal Nehru was also unveiled. The portrait was painted by Shri R. V. Gopalraju, an employee of the Depot Stores. Shri Tandon, before requesting the Chief Administrative Officer to declare the building open and to unveil the portrait of Shri Jawaharlal Nehru, stressed on the duties and responsibilities of the Stores Department in general and exhorted the staff of the Depot to maintain a high standard of work and take the opportunity offered to them in this Factory for enriching their knowledge

and giving still better service to the Administration.

Shri K. Swarup, the Chief Administrative Officer, then spoke briefly in appreciation of the working of the Stores Department and complimented the staff of the Depot for their enthusiasm and good work. He then declared the building open by pressing a button, which illuminated a model of the building placed nearby and simultaneously lighted the outside of the main building. He then unveiled the portrait of Shri Jawaharlal Nehru.

The Chief Administrative Officer also presented to Shri R. V. Gopalraju a small purse given by the staff of the Depot in appreciation of his execution of the portrait. Two small cups were also presented to Sri Kannan and Sri Subbiah Achari, the carpenters, who had produced the model of the main building. Shri K. K. B. Panikker, Depot Store-keeper, then proposed a vote of thanks. With the singing of the National Anthem, the function came to an end.

The Chief Administrative Officer, Shri K. Swarup, presented a purse to the painter of the portrait of Shri Jawaharlal Nehru.



VISITORS TO THE FACTORY

Members of the State Small Scale Industries Committee visited the Integral Coach Factory on the 7th November, 1958.

On the 13th November, 1958, Shri R. K. Jerath, First Secretary (Commercial)-designate to Japan, paid a visit to the Factory. He expressed the opinion that he was greatly impressed by the layout and the efficiency of the workers which was so obvious even in the brief lookround that he had.

Mr. Edwin Wipf, Editor of the newspaper published by the Swiss Car and Elevator Manu-

facturing Corporation Ltd., visited the factory on 14-11-1958. A delegation of Nepalese students accompanied by a Liaison officer from the Government of India visited the factory on the 18th November, 1958.

Twenty-five selected congress workers from the districts of Tamilnad who were undergoing training in Madras to have a complete knowledge of the developmental activities undertaken by the state and the philosophy and objectives of the Five-Year Plans, visited the factory on the 27th November, 1958.

MODAK RUBBER PRODUCTS PRIVATE LIMITED

(ON THE APPROVED LIST OF D. G. S. & D. NEW DELHI)

WELL-KNOWN MANUFACTURERS OF RUBBER
GOODS IN NATURAL AND SYNTHETIC
RUBBERS TO CUSTOMER'S SPECIFICATIONS

Tel: 62139

SEWREE

Gram: 'MODRUB'

BOMBAY 15

INTEGRAL COACH FACTORY INSTITUTE

AMATEURS' EVENING

With a view to encourage artistic talents among I.C.F. employees and their families, the I.C.F. Institute Committee arranged to conduct an "Amateurs' Evening" on the 15th November 1958 in the Open Air Theatre of the Institute. Shri K. Swarup, Chief Administrative Officer, and Shrimati Swarup were present amongst a large gathering. There were 17 items of display consisting of vocal, orchestral and instrumental music, dances, mimicry, plays, fire and sword displays etc. Nearly 40 selected artists participated in the Show and displayed their talents for about three hours amidst ovations from the large gathering, who witnessed the Show with keen interest.

At the conclusion of the Show, the Judges, who had been nominated, declared the winners of the first and second prizes. The artists who got these prizes were Shri A. Kannan and party for "Viswamitra and Menaka dance" and Shri B. Lakshmana and party for "Fire and Sword display." Shrimati K. Swarup gave away the prizes to the winners at the request of Shri K. M. Aiana, Deputy Chief Mechanical Engineer/Furnishing and President of the Institute. The President said that all the items displayed were so good that the Judges found it extremely difficult to decide the winners. He paid a tribute to the artistic talents of those who participated in the Show and congratulated the prize winners.

CO-OPERATIVE WEEK CELEBRATIONS

The All India Co-operative Week was celebrated with great enthusiasm from 1st November to 7th November 1958 in the I.C.F.

The Consumers' and Women's Day was celebrated at the I.C.F. Institute under the presidency of Shrimati K. S. Sastri, M.A. Shrimati T. N. Ananthanayaki, B.A., B.L., M.L.A., addressed the gathering and in the course of her speech stressed on the role that women could play in organising and promoting co-operative institutions. In the course of

her interesting speech, she pointed out the benefits of co-operation.

The Workers' Day was celebrated under the presidency of Shri K. Swarup, Chief Administrative Officer. Shri Swarup, in the course of his speech, vividly portrayed the salient aspects of co-operative societies and appealed to the management of the Co-operative Stores in the I.C.F. to take more interest in the administration of the Stores and to rally more and more members for the institution.



Children singing the National Anthem at the Women's Day function during Cooperative Week

Wit and Whistle

1. After a long argument over the admissibility of a question to a witness, the court called for a short recess during which the Counsel referred to as many as a hundred books. It was a will case and finally the court overruled the objection. The Judge said, "The question may be asked." The witness asked, "May I know once again what the question is, please."

The Court Stenographer read the question, "What did the deceased say just before he signed the will?"

The witness answered "Nothing."

2. "Repeat the words the defendant said," said the lawyer.

"I'm afraid, I cannot. They are not fit to be told among gentlemen."

"Well then," said the Counsel, "Whisper them to the Judge."

3. A politician said to Abraham Lincoln once, "I am a self-made man, Sir." "That, Sir," said Lincoln in the same tone "relieves the Almighty of a terrible responsibility."

4. Once a debtor, while borrowing money from the creditor, was asked by the creditor for a statement to be made on a sheet of paper in token of the transaction. As he was searching for the paper the borrower said patiently: "Why do you want to waste your precious stationery too, Sir, along with your money."

5. An eminent painter once painted a scene showing a man in death agony with the evening sun as a background. Having used much of his skill on it, he brought a friend of his, a doctor, to examine it. "What is your opinion about it?" asked the painter.

The doctor, after a careful and long study, removed his spectacles and said, "Must be suffering from yellow fever."

6. A lady took a bet with her friend that she could make President Coolidge speak. Cornering him at a dinner, she sought to make good her bet.

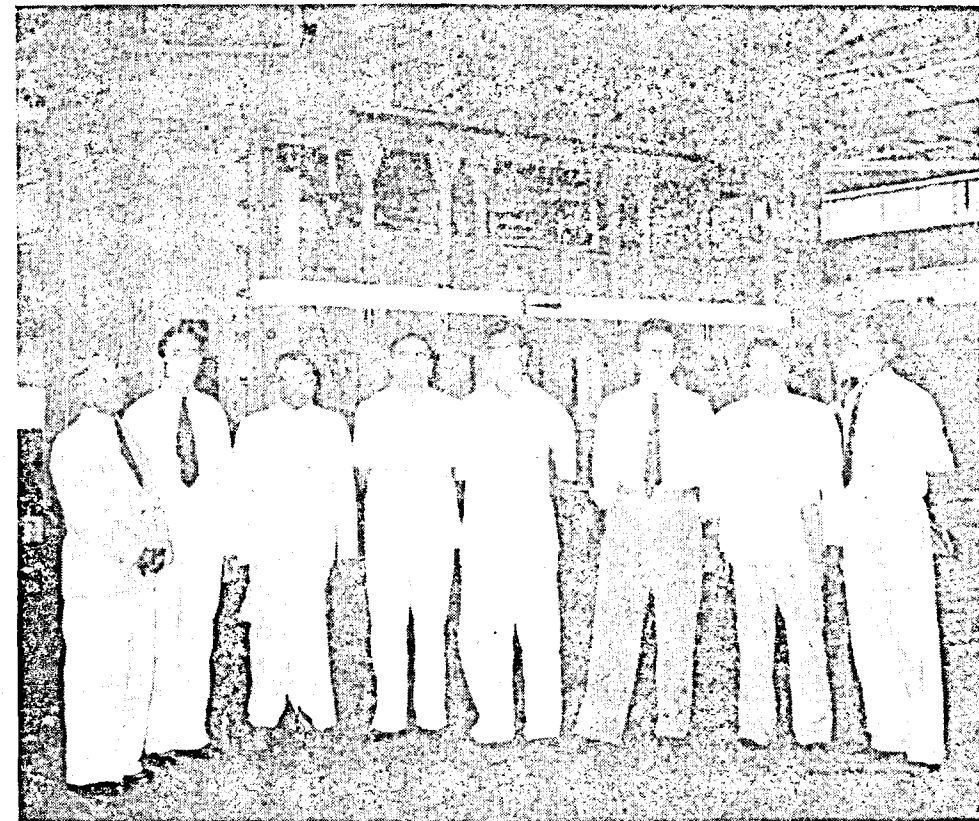
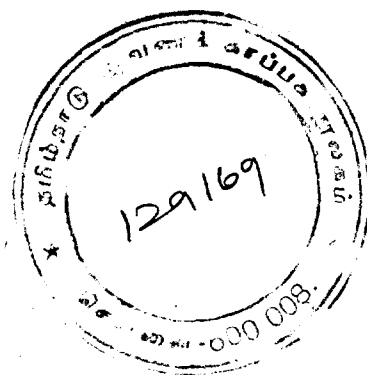
She said, "Oh, Mr. President, I have taken a bet that I can make you say at least three words."

Coolidge replied "You lose."

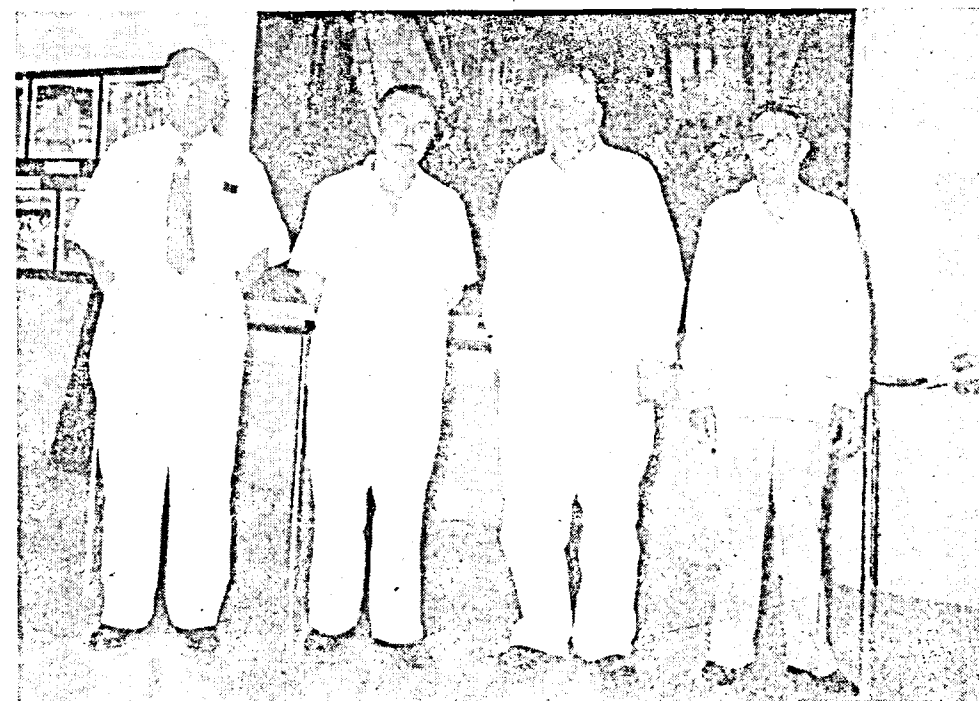
NEWS MAKERS

Our felicitations to

Shri S. Mahalingam, Stenographer, Stores Department in scale Rs. 80-220 posted as Stenographer in scale Rs. 200-300 with effect from 27-11-58.



Members of the Small Scale Industries Committee who visited the I.C.F. on 7-11-58



Mr. J. Savage (second from left) of M/s. Tube Products Ltd., England visited the factory on 7-11-58



129169



Edited and Published by K. Santhanam, Secretary to the Chief Administrative Officer, Integral Coach Factory
Madras 23 and Printed by M. G. Daniel at Thompson & Co. Private Ltd (Minerva Press) Madras 1