

4215

Rail Coach



Vol. II

1958

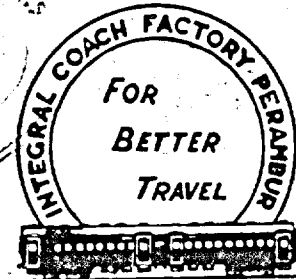
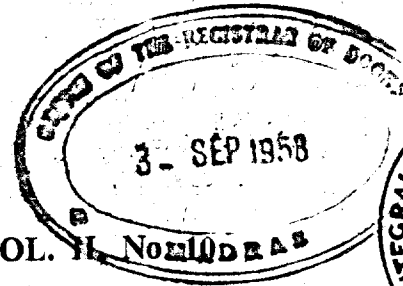
No. 10, 11

July 1958, Aug. 1958

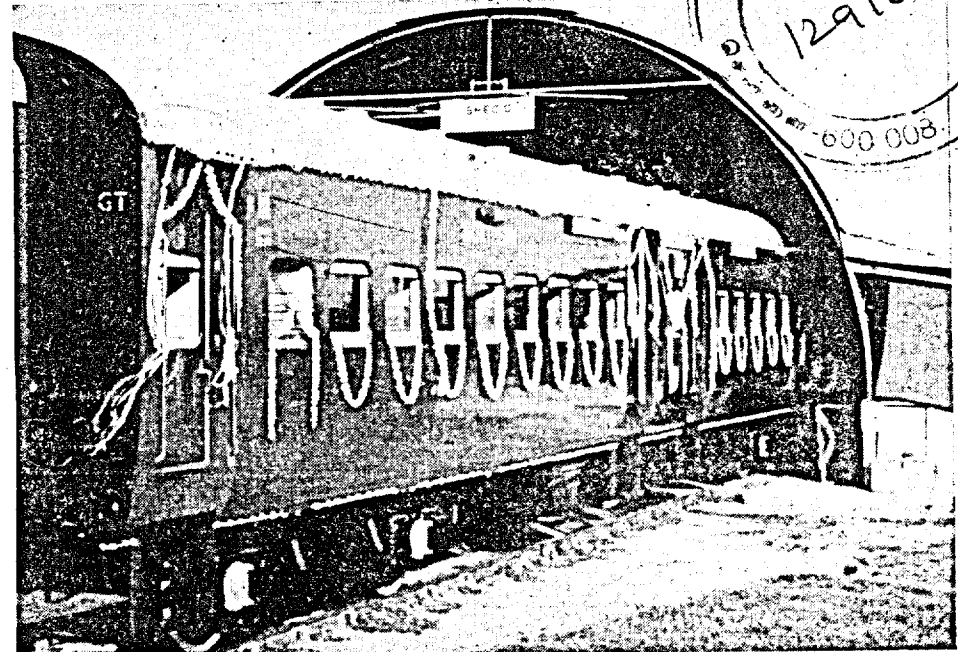
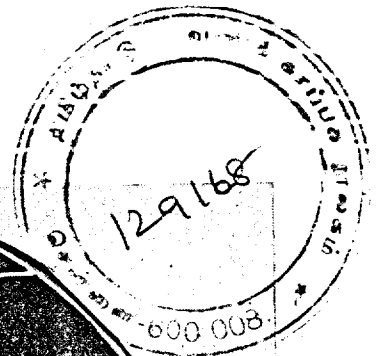
JL
D 5/5 m211P, NSTR 2
N 58. 2. 10.
12 9168

360

RAILCOACH



JULY 1958



The 100th Furnished Coach turned out by the Furnishing Unit on 19-6-58

PRICE 25 NAYE PAISE

129168
JL
D. 515 m 2 11P, N 51 R 0
N 51.2.10

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	55	(i) Full page	Rs. 125
Quarter page	30	(ii) Half page	70
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		

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.

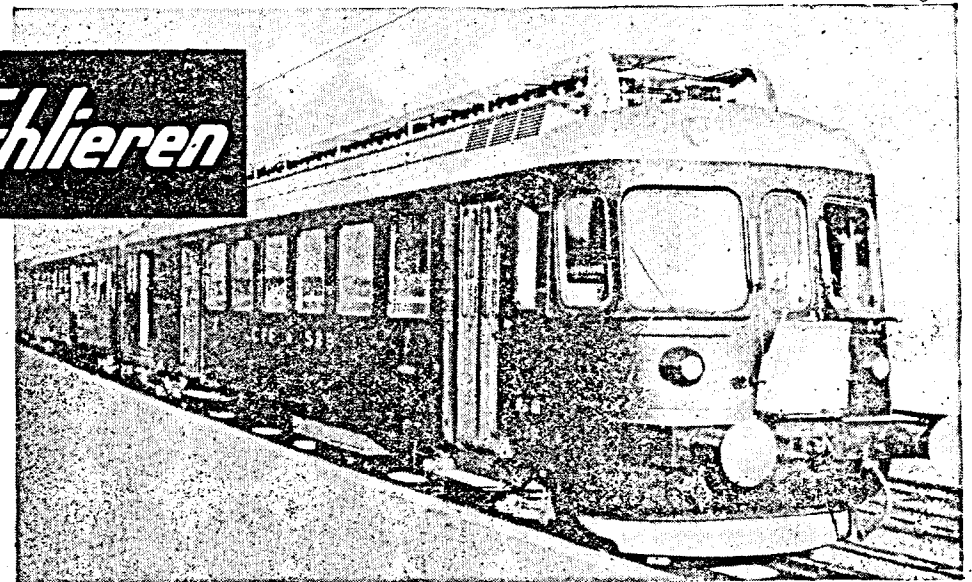
Further particulars from

The Editor

RAILCOACH

Integral Coach Factory, Perambur, Madras 23

Schlieren



Electrical Railcar for two
coach-units of the line Ge-
neva-La Plaine (Switzerland)

1500 Volt d. c.; performance 4 x 300 HP; speed:
65 m/h; tare weight: 49 tons; containing passen-
ger compartment (50 seats) and luggage compart-
ment: equipped with latest bogie type SCHLIEREN.

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

BÊCHÉ

pneumatic POWER HAMMERS

Completely self-contained

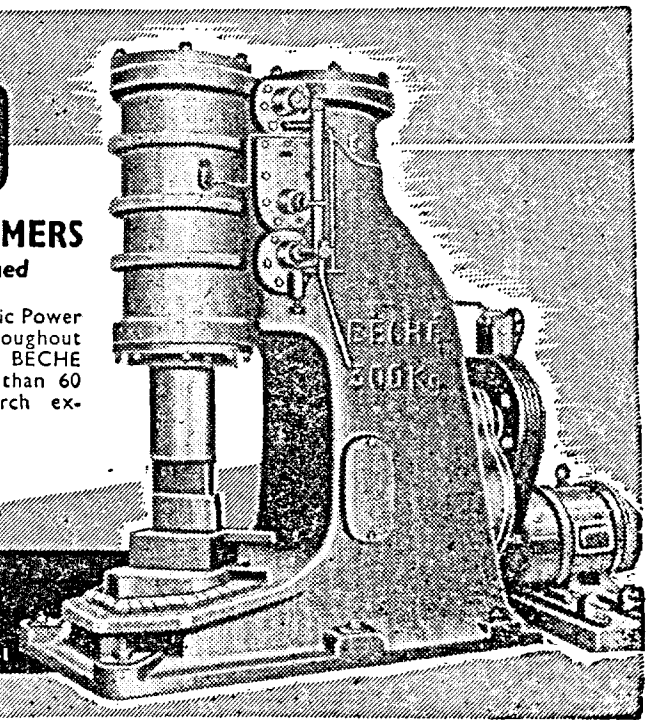
More than 12500 BÊCHÉ Pneumatic Power Hammers are in operation throughout the world. The reputation of the BÊCHÉ Hammers, gained through more than 60 years' manufacturing and research experience, is based on

Highest efficiency
Economical and
trouble-free operation.

SOLE DISTRIBUTORS

FRANCIS KLEIN & CO.,
PRIVATE LTD.

1, ROYAL EXCHANGE PLACE, CALCUTTA-1



Resident Engineer in South India:

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

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.

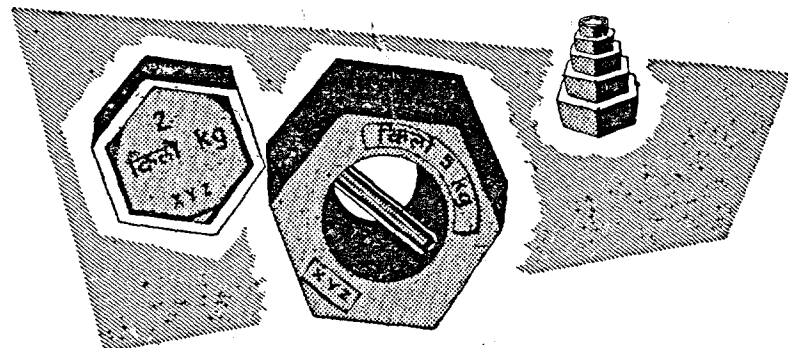
Annual Subscription ... Rs. nP.
3 00

CONTENTS

JULY 1958

	PAGE
Editorial	5
Men of the Month	6
News and Notes	7
Every Boss a Mediator	13
Launching of the 100th Fully Furnished Coach in the Integral Coach factory	17
Safe use of Electricity at Low Pressure for Domestic Purposes	19
March of Science	23
Accidents and How to Prevent them	25
Farewell to Shri Rajagopalan	29
Visitors to the Factory	32
Railway Passes: A Thought	33
ICF Thanks giving Service	36
The Seasonal Issue	40
ICF Children's Holiday Camp	43
Brain Teasers	46
Wit and Whistle	47
Our Family	48
Newsmakers	49

CHANGING OVER TO THE METRIC SYSTEM



India has at present no common system of weights and measures. There are not less than 143 systems in use. This multiplicity gives room for malpractices. The introduction of a uniform system throughout the country based on Metric Weights and Measures will be very convenient and make calculations extremely easy, especially because the country has already adopted the decimal coinage. The Standards of Weights and Measures Act, 1956 has laid down the basic units under the metric system. The reform will be gradual so as to cause minimum inconvenience to the people.

Even after its introduction in an area or a trade, the traditional weights and measures will be permitted to be used for a period of three years.

THE CHANGE-OVER TO THE
METRIC SYSTEM OF WEIGHTS
AND MEASURES BEGINS
FROM OCTOBER, 1958

KNOW
THE
METRIC
WEIGHTS



The unit of weight is the
KILOGRAM = 1 seer 6 tolas
(or 86 tolas.)
or 2 lb. 3 ozs.

SUB-UNITS

10 milligrams = 1 centigram
10 centigrams = 1 decigram
10 decigrams = 1 gram
10 grams = 1 decagram
10 decagrams = 1 hectogram
10 hectograms = 1 kilogram

MULTIPLES

100 kilograms = 1 quintal
10 quintals or
1,000 kilograms } = 1 metric tonne

1

ISSUED BY THE GOVERNMENT OF INDIA

editorial

FAREWELL TO SHRI R. RAJAGOPALAN

The month that passed by will be long remembered by those of the Integral Coach Factory, particularly by those of the Furnishing Project, on account of the launching of the 100th furnished coach and the laying down the office of the Deputy Chief Mechanical Engineer/Furnishing by Shri R. Rajagopalan. The mammoth farewell arranged and the vast number of staff that turned up at the farewell bore eloquent testimony to the popularity of Shri R. Rajagopalan. As remarked during that function, farewells are inevitable in service, but so far as the ICF is concerned they are becoming too frequent. Though Shri R. Rajagopalan could not have the satisfaction of bringing into fruition the factory, which was taking shape nicely under his able guidance, he had at least the satisfaction of turning out the 100th furnished coach in record time. He has shown what can be achieved, even with meagre facilities. Glowing tributes were paid to his ability during the farewell, but nothing would please him more than to hear at a later date that the factory of which he was the architect has lived up to the expectations. We have no doubt the staff of the Furnishing Project will maintain the high standard built up by him and give him the satisfaction.

He won the hearts of his staff by his gentle and pleasing manners and by persuasive methods he not only got the allotted task done but done in a thorough manner.

He was a popular social figure and one cannot easily forget the delightful parties he held at his residence ably assisted by his charming wife. We join with the other members of the ICF family in wishing Shrimathi and Shri R. Rajagopalan and their children the very best in the future.

* * *

Details of the significant event, viz., the launching of the 100th furnished coach, recorded by the Furnishing Project, are published elsewhere in this issue. All those associated with the Furnishing Project deserve our hearty congratulations and it is hoped that those, who have done remarkably well with the meagre facilities, will certainly emulate their brothers of the Shell Factory in bettering the targets laid down.

MEN OF THE MONTH

Shri K. P. Thimmaiah, Fitter, B. Shop hit the headlines by putting up a suggestion, which was accepted by the Standing Screening Committee. He suggested the printing of the following slogans on the Pay Envelope :

1. "Keep this envelope. It is a record of your earnings."
2. Safety slogans with a view to propagating safety consciousness amongst the employees.

The committee accepted this suggestion as it will tend to cultivate the habit amongst the employees of retaining the pay slip for reference purposes and also increase the safety consciousness amongst the staff and may benefit the Administration indirectly bringing down the number of accidents and the consequent loss of man power. Shri Thimmaiah was given a cash award of Rs. 50.

Shri C. P. Gajendran, Senior Clerk, Shop 26 came up with a suggestion, which received the commendation of the Screening Committee.

Shri Gajendran suggested that, to promote better turn-out of work from the newly recruited staff of this factory and to enrich their knowledge a monthly gathering or meeting wherein lectures could be given by experienced heads of sections as deputed by the office.

This suggestion though not entirely a new one, as certain departments have in vogue a system of training ministerial staff who have been newly recruited in appreciation of the effort put in by the author in pinpointing a definite necessity for such a course, the committee was pleased to recommend that a merit certificate be awarded to him during the next Railway Week Celebrations.



Photograph shows Shri K. P. Thimmaiah receiving the cheque from the CAO(R)

NEWS AND NOTES

Air-conditioned Railway coaches

Pursuant to Union Government's policy of not making any more air-conditioned coaches, Shri S. V. Ramaswami, Union Deputy Minister for Railways revealed that the plant intended for manufacture of such coaches could be utilised for manufacture of air-conditioned vans for transporting perishables, fish, leather, etc., so that the plant need not be abandoned.

Out of nine air-conditioned coaches ordered, two have already been sent for use, three were in the shops awaiting orders from Railway Board for assignment to different railways and the remaining four in partial construction. The four under partial construction might be completed or converted into First or Third class compartments as directed by the Railway Board. Anyhow, the construction of air-conditioned coaches in the workshops has been suspended since orders to that effect had been issued by the Railway Board.

Model spring cooling machines are being manufactured at the Golden Rock Railway Workshops and there is a proposal to meet the entire requirements of such machines of all railways in India.

Second plan of railways

The Union Deputy Minister for Railways, Shri S. V. Ramaswami, stated at Bangalore on June 3, 1958 that in the interests of national economy, it would appear that taking up of the Bangalore-Salem metre gauge line during the Second Five-Year Plan would be very profitable.

Shri Ramaswami, who was speaking under the auspices of the Mysore Chamber of Commerce, who had presented to him a lengthy catalogue of demands, including the opening of several new railway lines, observed that the only possible line that "may, with great difficulty—I do not make any assurance—be taken

up is the Bangalore-Salem link. This is because, not merely is it an operational necessity, but has become, so to say, a national necessity."

The Deputy Minister for Railways, elaborating this subject further, said that when the Government had taken a decision for the construction of the Khandwa-Hingoli link, the Bangalore-Salem link became a corollary. The metre gauge line between Bangalore and Salem would link up Bangalore with Cuddalore. The new link between Bangalore and Salem became vital, he added, in the context of certain agreements India had entered into with Japan. Unless India was in a position to send manufactured goods to other countries, repayment of moneys they had borrowed would become very difficult. India was fortunate in that nature had bestowed her with certain commodities like iron ore and manganese, which were in great demand in other countries. Mysore was rich in these minerals which Japan required. India could export ore to Japan and earn yen and pay for the manufactured goods they obtained from Japan. "If the Bangalore-Salem link is taken up, it is because of the compelling necessity of strengthening the economy of India and exporting something which will earn us foreign exchange."

It was in this context, the Union Deputy Minister added, that the Government might take an early decision in regard to the Bangalore-Salem link than they would otherwise have done. The Minister then categorically stated that with regard to other new lines they had to be given up so far, at any rate, as the Second Plan period was concerned.

With regard to the Chamarajanagar-Satyamangalam line, in regard to which there had been a demand for quite some decades now, the Deputy Minister referred to the decision taken by the Planning Commission and the

cutting down of the allotments in regard to new railway lines. The reports in regard to this new line were not at all favourable. The Chamarajanagar-Satyamangalam line would prove to be a very expensive project and not a paying one. "I do not think it is possible at all in the Second Five-Year Plan."

Referring to the Mangalore-Hassan line, Shri Ramaswami said that reports had been received about this line. On a map, the distance between Hassan and Mangalore would appear to be about 100 miles only, but when one looked at a relief map, it was found that the railway had to be constructed across the western ghats and the construction of railways across the ghats was not an easy task. He agreed with the view that in the context of the reorganisation of Mysore State, the Mangalore-Hassan link was a vital one. But it was well to remember that the railways had to function within the limits of men, money and materials available. Though the reports in regard to surveys in respect of the Hassan-Mangalore line had been received he was afraid, the Deputy Minister said, that this line would not be possible in the Second Five-Year Plan period.

Referring to facilities at the Bangalore City railway station, he said that the railways had undertaken the construction of a big marshalling yard at Yeshwantpur, at a cost of Rs. 21 lakhs and about 70 per cent of the work had now been completed. The new marshalling yard would be able to handle about 640 wagons and for the present, it was more than enough. This new yard would relieve congestion in the Bangalore goods yard.

Shri Ramaswami hinted that currently there was a programme for increasing the amenities in the Bangalore City railway station, at a cost of about Rs. 2.25 lakhs. "I have no doubt that the Railway Ministry will pay the necessary attention to Bangalore," the Minister said. Referring to the request for more bogies being attached to the Madras-Bangalore mail

and express trains, the Deputy Minister said that they in Bangalore were fortunate, for the position was not so bad as they experienced in respect of the three mail trains which left Madras Central to Nilgiris, Malabar and Mangalore. The track between Bangalore and Madras was good and it could take in W.P. engines and this engine could take 13 bogies. Because of this, they were now having two additional bogies between Bangalore and Madras. The position was really bad in respect of the three mails referred to and the solution would be to have an additional express train, but he was afraid what the position would be remained to be seen.

Father's vigilance benefits son

A gateman of a railway level-crossing near Sheoraphuli, about 15 miles from Howrah has been rewarded for the 'vigilance and high sense of duty' shown by him in preventing a possible accident to a passenger train.

The reward, sanctioned by the General Manager of the Eastern Railway, is in the form of a monthly stipend of Rs. 10 to the gateman's eldest son for his educational expense. The stipend is for a period of four years.

The gateman, Sova, who was on duty on May 1, 1958 noticed that several fish-plates had been removed from the track. Finding the outer signal down for an approaching train, he immediately placed fog signals ahead of the tampered track and by the display of hand danger signal succeeded in stopping the train at a safe distance.

Subsequent enquiries revealed that 22 fish-plates had been removed from the track.

Equipment for Indian Railways

A Japanese firm has been given orders for the supply of 2,600 broad gauge 20 ton capacity wheel sets by the Indian Railways. The value of the contract is in the neighbourhood of £ 240,000 (about Rs. 32 lakhs).

Two Calcutta firms and one Bombay firm have received orders for the supply of goods wagons to the Indian Railways. One Calcutta firm has received orders for nearly 1,300 broad gauge and metre gauge wagons, while another Calcutta firm has received orders for the supply of 1,250 wagons.

The Bombay firm has received orders for supplying 675 broad gauge wagons.

The total value of the orders placed with the three Indian firms is in the neighbourhood of Rs. 422 lakhs.

Railway coach washing machine

The Western Railway engineers have invented an automatic railway passenger coach washing machine, which has given satisfaction in actual field service.

The first of its kind in India, the coach washing machine is 100 per cent designed and constructed by Indian engineers and workers at the Western Railway's passenger coach shed at Bombay Central.

The machine is much cheaper than its imported counterpart and its cost will be made good from the savings in recurring expenditure in less than two years' time.

With the help of this machine, passenger coaches can be washed much faster within the limited period during which the carriages are available.

Cases of railway accidents

In a bid to keep matters pertaining to train safety clear of departmental red tape, the Railway Board has issued a directive advising General Managers of all zonal railways to exercise "summary powers" for removing from service members of the staff held responsible in train safety cases.

Stressing the need for swift and adequate punishment and avoiding of undue leniency and softness in cases involving the lives of passengers, the Railway Board is also believed to

have laid great emphasis on the importance of discipline at all levels of railway services.

It is also pointed out in the directive that merely negative action will not do. Superior railway officers have been advised to take steps to increase personal contact among employees of all grades and to take more direct interest in their work and welfare. The Railway Board has enjoined on railway administrations the need for providing relief to overworked supervisory staff. The need for strengthening training and refresher courses has also been mentioned.

Camaraderie among railway staff

The Railway Board has decided to make a sustained drive to cultivate a spirit of camaraderie among railwaymen of all ranks, high and low.

The Board proposes to start the drive by having a country-wide chain of social functions including tea parties where railway officers and their wives would serve refreshments to railwaymen of all categories down to the lowest cadre. This drive will cover the 11,00,000 railwaymen in India.

This step is being taken to bring about better human relations between the officers and other sections of railwaymen by affording them opportunities to "sit together" at the social level and thus help root out the present "class barriers" between them.

Waiting rooms for women passengers

Women passengers travelling by the third class will hereafter be allowed to use waiting rooms which are at present meant exclusively for members of the fair sex travelling in higher classes.

According to a directive issued by the Railway Board, at stations which have only one waiting room for women passengers, Third Class women passengers will be allowed to share it with passengers travelling by First and Second Classes. At stations where two waiting rooms are provided, for women travel-



Opening of the Indore-Dewas-Ujjain Broad Gauge rail line. (Left) The first train steaming out. (Right) Dr. K. N. Katju inaugurating the line.

ling by the First and Second classes respectively, the latter will be thrown open to Third class women passengers also.

At places where the former Intermediate Class waiting rooms were converted for other use after the abolition of the Intermediate Class, wherever possible, these will now be re-opened for the use of Third Class women passengers.

Opening of the Indore-Dewas-Ujjain Broad Gauge rail line

The 49.23 mile Indore-Dewas Ujjain Broad Gauge line was declared open for traffic on the 19th May, 1958 by Dr. K. N. Katju, Chief Minister of Madhya Pradesh. Shri M. Ganapati, General Manager, Western Railway, in his opening speech welcoming Dr. Katju pointed out that this new line had been constructed in fairly quick time in spite of various difficulties, chief of which was the shortage of materials. He congratulated the Railway engineers on the fine job they had done. He traced the history of the proposal to provide Indore with a Broad Gauge link with the rest of the country, and stated that though this proposal had started as far back as the Holkar's days, it was only in 1953-54 that a regular survey could be carried out. The construction was sanctioned by the Board in

1955, and actual work started in September, 1956. The new line will prove to be a great facility for traffic, especially goods traffic, to and from Indore, as transshipment at Ratlam, Ujjain and Khandwa has been eliminated. In choosing the alignment for the line, the interests of Dewas were given due consideration and Dewas was included in the route of the line. Shri Ganapati then requested the Chief Minister to inaugurate the new line.

Dr. Katju formally inaugurated the new line by pressing a button which showed the progress and completion of the line in an attractive manner on an illuminated map. The Chief Minister said that by the provision of this new line, a fifty-year old dream and desire of the people of Ujjain, Indore and Malwa have been fulfilled. He also expressed the hope that the Indore-Dewas-Bhopal link will also be constructed early so that Indore could be brought nearer to Bombay. The Chief Minister concluded his speech congratulating Shri M. Ganapati, the General Manager and all the railway employees and contractors who had taken part in the construction of the line.

A special train left Ujjain at 10-20 a.m. on the same day for Dewas and Indore carrying the Chief Minister and other special invitees over the new line.

The new alignment passes through a part of Malwa Plateau with an average elevation of about 1,700 ft. above mean sea-level. The general inclination of the land is rising from Ujjain to Indore—an approximate rise of 200 feet in 50 miles. Approximately 450 lakhs cubic feet of earthwork was required for the work. 105 bridges have been provided out of which 11 are major bridges. The most important bridge on this line is across the Sipra river, 18 miles from Indore. It is the largest river crossed by the new line and has a catchment area of about 240 square miles at the bridge site. The bridge consisting of 6 spans of 60' prestressed concrete girders carried over mass cement concrete piers founded on hard rock, has been constructed at an estimated cost of Rs. 12.15 lakhs.

Due to the acute shortage of mild steel in the country prestressed concrete girders have

been provided on the "Sipra" "Khan" and three other important bridges. In all, seven 60'-0" fifteen 40'-0" and one 30'-0" span prestressed girders have been constructed. This is the first time that these girders are provided on bridges on the Western Railway.

The station buildings are of modern type, and have been provided with tea stalls, waiting rooms and spacious waiting halls. Adequate provision for water has been made at all stations.

About 400 staff quarters of various types have been provided at a cost of Rs. 23 lakhs on this construction.

This new line provides a very useful Broad Gauge link in the area and will considerably help the industrial development of not only Indore and Dewas, but the area as a whole.

It is not without reason that Indian & British Standards Institutions lay down exacting specifications for Cotter Pins.

Dimensional accuracy is of paramount importance; we have the right machines, the right material and the necessary technical skill.

It is the attention to detail that counts in the long run.

*accuracy
is the best
policy*

Manufactured under the
NETTLEFOLDS
Trade Mark by
GUEST, KEEN, WILLIAMS, LIMITED
and distributed by
NETTLEFOLDS OF INDIA PRIVATE LTD
P. O. Box 1502, Bombay-1

NF-58-7

EVERY BOSS A MEDIATOR

BY

FRANK M. KLEILER

Executive Secretary, National Labour Relations Board, Silver Spring, Md.

(Reproduced by special permission of "Factory Management and Maintenance," March 1958. Copyright by McGraw-Hill Publishing Company, Inc.)

THIS SAVVY OBSERVER'S SLANT ON SUCCESSFUL BOSSMANSHIP WILL GIVE YOU A NEW APPROACH AT EVERY PLANT LEVEL—FROM EXECUTIVE DECISION—FINDING TO GRIEVANCE—HANDLING.

"IT'S LUCKY you weren't born a girl," an industrial relations director tells a foreman.

"What do you mean?" the foreman asks.

"You never say 'no.' You're everybody's sweetheart. The union praises you because no grievance from your department goes beyond the first step. But you've said 'yes' so often that you've given away management rights."

The foreman thinks he gets the point. He turns down the union steward on the next five grievances—and is reversed on all five in the grievance procedure's second stage.

It's still the foreman's fault. His error? Failure to understand the contract.

This supervisor went from one extreme to the other, but the incident illustrates the dilemma in which even a smart, well-trained foreman—or a top manager—often finds himself. The human relations approach in management requires him to be a "good guy" to his men. If he says "no" too often, they rebel or fail to respond to his appeals; on the other hand, he must be the day-to-day enforcer of company policy. If he says "yes" too often, the top brass identifies him as a weakling or an appeaser who surrenders management authority.

Where did our foreman go wrong? He failed to understand that the role of the boss

has changed. That the day of the martinet—the decision dictator—is gone. That bosses these days don't decree decisions—they search for them among conflicting views. In trying to make the transition our foreman lost perspective, became a pushover.

Pity the poor foreman. In a large corporation he has little to do with formulating company policy. The bigger bosses insist that he always be loyal to them—and to their policies—even when they make mistakes. But they still pull the rug out from under him when he makes a mistake. All the while they expect him to have the confidence, respect, and loyalty of the workers assigned to his tender supervision.

What makes a Mediator

What does a manager—foreman or executive—need to be a successful mediator? He needs to understand the process of mediation. His main duties as a mediator can be summarized like this:

... See that disputing parties discuss differences dispassionately.

... Make certain each faction fully understands the other's position.

... Explore every phase, including possible underlying motives.

... Help parties foresee what will happen if they fail to settle.

... Suggest alternatives to conflicting positions of the disputants.

... Try every conceivable way of obtaining agreement.

A commissioner of conciliation who has mediated hundreds of disputes between unions and employers once told a group of foremen :

"My job consists of talking. I'm a go-between. When one side asks for too much, I try to persuade them to be satisfied with less. When the other side refuses to give what seems reasonable, I try to wear down their stubbornness by persuasion. I cannot *compel* anybody to *do* anything. All I can do is suggest or recommend. And my ideas are no good unless they are soundly supported by facts and logic."

"That sounds like my job" one of the foremen remarked cynically, "I don't have any authority either, and I spend most of my time talking. My men have beefs that I can't settle myself. And when the front office wants something extra in service from the department, I have to plead with the men to get the job done. I'm only a go-between."

Fenced-in managers—Foremen complaining about their own lack of authority are common in modern industry. With the growth of collective bargaining there has been a change in the role of the front-line supervisor. "In the old days," explains Prof. William F. Whyte, of the New York State School of Industrial and Labour Relations, "the foreman really ruled the roost in his department. One of the first union attacks was on the foreman, challenging his decisions. And so management generally was inclined to limit the foreman's freedom of action, to make him check with superiors before he gave an answer to a grievance. Management has been afraid that if you let the foreman in Department "A" make a settlement, this will open you up to a similar move in Department X, and so a uniform approach is essential."

Few foremen seriously try to buck the trend. Some of them may pine for the good old days when they could fire a man for insubordination, gold-bricking, or breaking plant rules. But

they know from bitter experience that when one foreman handles discipline in his own way, he makes it tough for other foremen who may have quite different notions of what constitutes fair treatment. Grieving employees usually can win in the later stages of the grievance procedure by showing different handling of the same problem in different departments.

The foreman is not the only one to fret about the limits on his freedom of action. Few if any executives have as much authority as they would like. In unionized plants they can do little that affects wages, hours, and working conditions without consulting the union. A top executive operates between the pressures of a board of directors on one side and a union on the other. Moreover, in his daily administration his freedom to function is subject to pressures from customers, from the Government, and from a vast conglomeration of specialists on the company payroll—purchasing agents, accountants, tax experts, personnel men, engineers, and others—whose zeal to do their respective jobs well brings them into conflict with each other.

Mediating at High Level

It's a hoary truism that an executive's chief value is his ability to make decisions. But does he really make the decisions—or does he find them by getting agreements between others who are advocating conflicting programs?

There are occasions when the big boss must make a ruling that leaves some of his subordinates glowing with satisfaction and others fuming. Then the ranklers either blame the boss or blame those who sold the boss the idea. Either way, the situation is unhealthy and is to be avoided. If possible, a good executive gets agreement on (or acquiescence in) a decision before he makes it. The process is much like that of mediation. It is a process of talking things over until each disputing faction fully understands the other's view-point

and the stage is reached when either a compromise is effected or one side gives in.

A veteran mediator of labour disputes left his Government job to enter the management consulting business. Later one of his old associates asked him "How come we never find you representing employers in negotiations with unions, John?"

"Because I don't have much to do with labour disputes," the ex-mediator replied.

"Then what in the world does a man with your background of handling labour disputes do as a management consultant?"

"I'm mediating disputes in the management hierarchy."

His friend looked incredulous.

"Some corporations call in outside consultants when the big shots in the company can't agree on how to solve a problem", explained the mediator-turned-consultant. "Sometimes the outside consulting firm is so expert on the problem involved that it can make a study and follow it up with a recommendation, which is then adopted as the company's decision. But occasionally the consultants do what amounts to a mediation job between conflicting factions within management. And here's where I come in. Using the old techniques that I learned in handling strikes, I iron out differences among corporation executives."

Not all management consultants are mediators. As experts on various problems, they earn their bread and butter by giving advice to top executives. Their advice is useful. They know more than the executives about some problems. And they can concentrate on an assignment without all the harassing interruptions that a company executive would encounter if he tried to handle the assignment without outside help.

It's a rare management consultant who does not sometimes do a little mediating among

executives. Installing a new cost accounting system, eliminating production bottlenecks, or other consulting jobs involve changes. Changes affect functions of various segments of the company, and status of individuals in ways that make some executives happy and others unhappy. To be sure that his solution to a problem is practical, a management expert needs to look at things from the diverse viewpoints of those affected by the solution. The solution usually works best if those who have to live with it agree to it. Many a sound proposal by a consultant has been filed away and forgotten because nobody laid the groundwork for its acceptance.

"Must" for Managers

Skill in mediation is valuable in a management consultant, but it is more than valuable in an operating executive or supervisor—it is essential. Supervisory authority based upon fear is outmoded. Unemployment compensation, help-wanted ads in the papers, union grievance procedure, and more education have combined to make rank-and-file industrial workers less afraid of their bosses.

A modern foreman knows that he needs reasons for what he says or does. That calmly delivered instructions or suggestions get better results than curt commands. That discipline improves more by encouragement than by threats or punishment for bad performance. And that decisions handed down from above are seldom as acceptable or workable as those hammered out in discussion. Whether he is dealing with animosities among employees or with differing management factions, he tries for an amicable adjustment.

New look at grievances: This condition may warrant a new look at the foreman's role in the handling of grievances. Perhaps the realities of modern industrial society require modification of some of the time-honored concepts of proper relationships between supervisors and employees and between supervisors and

higher executives. Often there are three points of view in connection with grievances—the employee's, the management's, and the supervisor's. This concept may offend the purists who insist that the supervisor is *always* part of management, but the distinction between immediate supervision and top management needs to be recognized.

The employee's grievance may be against a foreman's decision. If so, it's like an appeal to higher authority. In such instances, higher authority can back up the foreman whose action the griever is protesting. In other words, the appeal may be denied. But if management aims to be fair, it will examine the protest objectively. After getting both sides of the story (the employee's and the supervisor's), management attempts to make an adjustment satisfactory to both, if the foreman is not 100% right. In other words, management *mediates*. It searches for a face-saving solution that lets the foreman and the aggrieved employee work together harmoniously in the future.

If the grievance is a beef against a policy or situation that is beyond the power of the foreman to control, the foreman in some plants simply passes, letting the griever go to the next stage in the procedure. This makes a great deal of sense to the union. A steward does not want to waste time arguing with a foreman who clearly is powerless to grant the relief. But what happens to the foreman's status? The employees look to the steward for help and leadership instead of to the foreman.

What A Foreman Needs

A foreman who really wants the loyalty of his men does not act like an innocent bystander when he receives a meritorious complaint that is beyond his power to adjust. He

handles it by taking it on himself to explore with his superiors the chances of getting some relief. In other words, he acts like a mediator. On one side he has the personnel department and various company officials who depend upon him to explain the case. On the other side are the employees or union officials, who in the first instance expect him to explain the company's position.

The first step for a foreman—as a mediator—is to make sure he understands both sides of the case. He listens patiently, asks questions, and gets the full picture from the griever's point of view. He then gets the other side of the story—from a higher level of management. If he finds the grievance is unsupported, he explains to the griever why it should be dropped. If he finds it well taken, however, he works on the proper company official to get an adjustment.

The diversity of issues and the varying combinations of personalities appearing at the conference table require versatility in the mediator. His success may depend upon timing—the disputing parties need to be conditioned before they are ready to accept a proposed solution. His success may depend upon resourcefulness—every mediator has a bag of tricks for persuasion or a fund of experiences from which he can draw assorted proposals that have settled similar disputes on other occasions. His success may depend upon persistence—a mediator needs patience and faith that if given time enough, facts enough, arguments enough, the feuding parties will settle their differences or one of the parties will see the error of its position and capitulate. Above all, a mediator needs poise—and sympathy with the problems of others. So also does a foreman.

LAUNCHING OF THE 100TH FULLY FURNISHED COACH IN THE INTEGRAL COACH FACTORY

The hundredth fully furnished third class coach, was launched on 19th June 1958 from the temporary furnishing sheds of the Integral Coach Factory, Perambur, in the presence of a large gathering of officers and workers of the factory.

Shri R. Rajagopalan, Deputy Chief Mechanical Engineer (Furnishing), addressing the gathering and requesting the Chief Administrative Officer of the Factory to launch the coach, stated that it was significant to note that furnishing of Integral Shells, commenced with temporary facilities, had developed sufficiently to enable the completion of 100 coaches in the Factory. After briefly recalling the history of the Furnishing Project of the Factory, Mr. Rajagopalan stated that the Furnishing Annexe of the Factory would be connected with the I.C.F. by a siding, about two miles in length. This annexe will have a covered area of 5½ lakhs square feet and will consist of seven factory buildings, with a total number of 2,400 workers for its target production of 350 coaches per year in single shift working.

In order to speed up the final development of full production of coaches from the annexe, a novel plan was devised to commence furnishing production with some temporary and immediate facilities. The plan was accepted by the Government of India and it was in one such temporary shed that the hundredth coach of the Factory had been furnished.

During the year, up to March 1958, 72 coaches were furnished and at present, the production had been stepped up to a capacity of nearly 12 coaches per month. It was hoped to increase the outturn further to 18 coaches a month during the year. Shri Rajagopalan referred to the facilities for training the staff



Shri R. Rajagopalan, Dy. C.M.E. Welcoming the gathering

in the section, on standards and lines as in the I.C.F. and detailed how the trainees were later absorbed in suitable occupations.

Shri Rajagopalan stated that the Integral III Class Coach had incorporated in it all the amenities decided upon by the Government of India in consultation with the various advisory committees. He pointed out that the high standards and traditions built up in the I.C.F. were to a large extent due to successful Swiss collaboration.

Shri K. Swarup, Chief Administrative Officer, then addressed the gathering. He said :

“ We are trying to develop a good team of leadership and instill pride of workmanship. It is a pity that Shri Rajagopalan, who has been captain of your team, who has been your philosopher and guide during the early stages, when considerable thinking and planning had to be done, will be leaving us shortly on his transfer to Delhi. But I am sure that we would try to keep up the lead given by him.



Shri K. Swarup pressing the switch to launch the Hundredth Coach

It will be a matter of great satisfaction to him to see that the Furnishing wing develops according to his plans. We have still a big task before us and I would request you all to dedicate yourselves to the task that lies ahead of us in the same missionary zeal and team spirit in which you have done so far. We industrial workers have to make sacrifices to see the living conditions of the teeming millions in India improve.

"I am very happy to be with you to-day on this auspicious occasion and consider it a great honour to be asked to launch the 100th Furnished Coach. My prayer and hope is that we will be turning our more and more furnished coaches to serve our country-men

better and to eliminate the overcrowding that exists to-day. Before I conclude I would like to read out a message that I have received from Shri Isaacs, our Additional Member (Mechanical), on the occasion and I wish to join him in congratulating Shri Rajagopalan, his officers and men. On this occasion—

"I was very glad to hear the 100th furnished coach to be turned out on the 15th and appreciate the thought in asking me to be present for the occasion. I regret I cannot get down at present as advised to you over the phone on the 10th. Our congratulations to all, in their efforts and all the best for bigger things in the future."

"I have now pleasure in launching the 100th Furnished Coach, and may Almighty keep on showering His choicest blessings on all members of the I.C.F. Family.

JAI HIND

Special poojas were then performed for launching the coach and Shri K. Swarup gave the signal, when the hundredth fully furnished coach was drawn out of the temporary shed by a steam engine.

Shri G. M. Gadgil, Mechanical Engineer, proposed a vote of thanks.

The guests were then taken and shown inside the new furnished coach.

SAFE USE OF ELECTRICITY AT LOW PRESSURE FOR DOMESTIC PURPOSES

BY

R. VANCHINATHAN, B.E.

Chief Electrical Engineer, Northern Railway, New Delhi

(This article is primarily intended for non-technical but intelligent customers for domestic purposes. It is based on an article entitled "Safe use of electricity at medium and low pressure" by the author, which has appeared in "Electrotechnics" Nos. 15 and 16, dated September 1943, issued by the Department of Electrical Technology, Indian Institute of Science, Bangalore.)

In India the present standard voltage for electric supply to domestic consumers is 230 Volts, single phase, 50 cycles, A.C. (Alternating Current), although 230 Volts D.C. (Direct Current) is also in vogue in many old electric supply installations. Actually, in view of the great economics involved in the matter of transformation, transmission and distribution of electricity by adopting Alternating Current in preference to Direct Current electricity, the old D.C. installations are being gradually converted to A.C.

According to the definition given in Rule 2 of the Indian Electricity Rules, 1937 (as amended up to 31st December 1952) electric pressure is said to be "low" where the normal pressure is not greater than 250 Volts and the pressure in no circumstances exceeds 263 Volts. This "Low pressure" supply is considered to be safe for domestic use. Actually, however, it is not absolutely safe. Even a pressure of 50 Volts may be fatal at times to man and a lower pressure than this is often fatal to beast. From the point of view of absolute safety, therefore, precautions should be taken to prevent a person getting an electric pressure across him exceeding a lower safe limit, of (say) 25 Volts, while handling electrical gear.

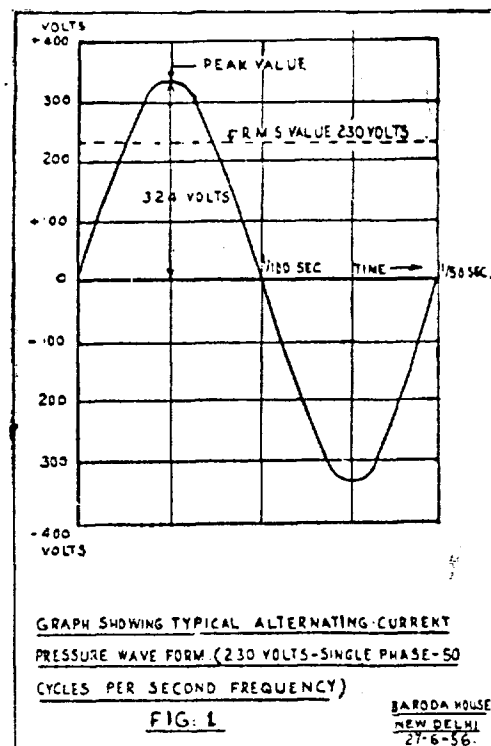
DC/AC

In this context, it is desirable that all consumers should understand the difference between D.C. and A.C. In the case of D.C., the electric pressure between the two "poles" is continuous and steady in one and the same direction at the rated figure of (say) 230 Volts, the positive pole being positive all the time and similarly the negative pole being negative all the time. Incidentally, it may be noted here that while the assumed direction of an electric current is from the positive pole to the negative pole through the "load" (say) lamp or fan, actually the movement of the electrons representing the flow of current in the conductors is in the opposite direction. However, this is immaterial as long as we stick to one common notation. The velocity of these electrons through the conductors in the direction of their movement is said to be that of light—i.e., about 186,000 miles per second.

AC Wave Form

In the case of Alternating Current, however, the pressure (voltage) and therefore the current also are alternating at the rate of the declared frequency, the standard frequency adopted in India being 50 cycles per second. Each complete cycle therefore covers a period of 1/50th of a second, during the first half of which the pressure between the two "poles" starts from 0 and gradually increases to a maximum of $\sqrt{2}$ times the declared voltage (which in our case is 230 Volts) and then drops to 0 again, but

all the time in the same direction. The waves form of the varying pressure is generally sinusoidal and the period from 0 to maximum and then to 0 again in one direction is 1/100th of



a second. Thereafter during the second half of the cycle the current changes direction and takes the opposite path, the pressure value again changing from 0 to maximum and then to 0. The shape of the pressure curve for the reverse direction is also sinusoidal and is exactly an image of the preceding half cycle. Figure 1 represents graphically one complete cycle of a pressure curve of Alternating Current at 230 Volts, single phase, 50 cycles per second frequency.

Peak and 'RMS' Values

It will be seen from the curve that the "peak" value of pressure reached once every 1/100th of a second is $\sqrt{2} \times 230$ or 324 Vots, although the declared normal pressure is only 230 Volts, which is known as the "RMS" value

or "Root Mean Square" value—representing the equivalent electric heat or power value obtainable from a steady pressure of 230 Volts Direct Current. Therefore 230 Volts Alternating Current is in fact somewhat more unsafe from the point of view of shock risk potential than 230 Volts Direct Current, although from the electric heat or power point of view both the voltages are "somewhat" alike.

HT Transmission and Distribution

Now electric power, generated in a Power House, will have to be carried from the Power House to the premises of the ultimate consumers—distributed over the country miles and miles away from the Power House. For transmission and distribution of electricity the higher the voltage the better, as the current handled for the same power is correspondingly less. This enables less copper to be used for the transmission/distribution of electricity and the saving on this account is considerable. A.C., as already stated before, has a great advantage in this respect, as it lends itself easily for transformation from one voltage to another. In large modern power stations electricity is generated at 11,000 Volts, 3 phase, 50 cycles, and this voltage is stepped up to 110,000 or 230,000 Volts or more for transmission to out-station areas, where, at what may be termed E.H.T. (Extra High Tension) sub-station, it is stepped down to 33,000 Volts for local E. H. T. Transmission to large consumers' Receiving Stations. At these Receiving Stations electricity is again stepped down to 11,000 Volts and distributed at this pressure to different load centres, where it is finally stepped down to a lower voltage for L.T. (Low Tension) distribution to serve the various consuming equipment.

LT Distribution and Supply

The standard system of supply adopted for Low Tension distribution is 400/230 Volts,

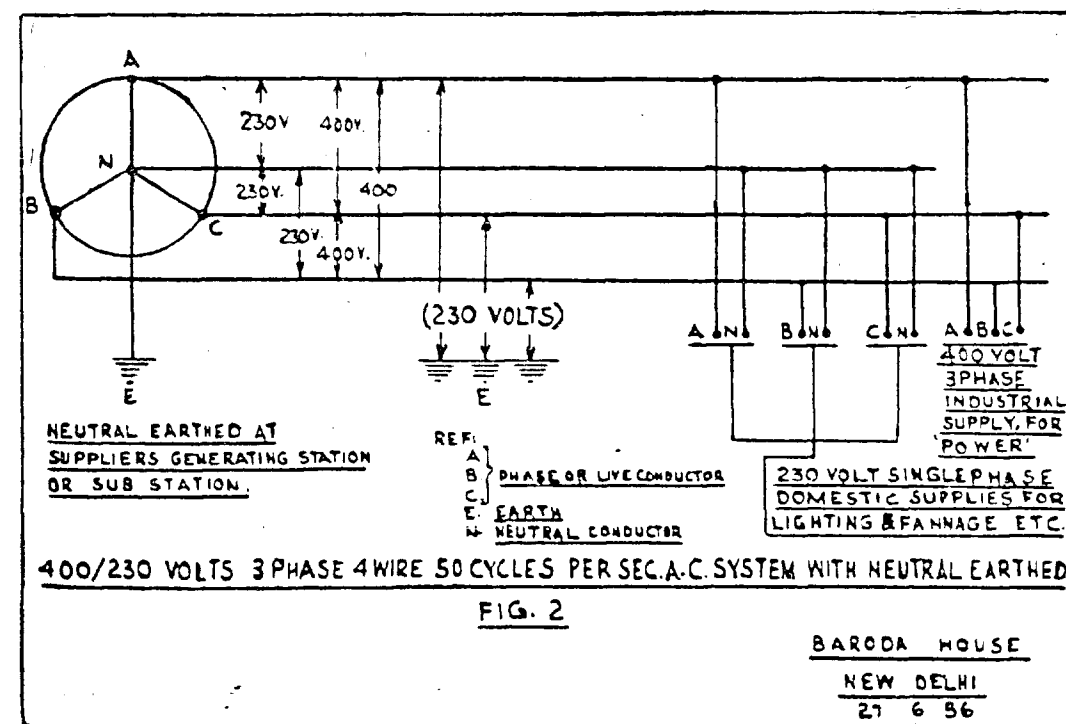
3 phase, 50 cycles, 4 wire A.C. with the neutral earthed, vide figure 2. Under the system there are 4 conductors used for carrying current :— 3 "phase" or "live" conductors and one "neutral" conductor. The voltage between phases is 400, which is "medium pressure" and unsafe for "domestic" use. However, by earthing the neutral point, the potential of each "phase" conductor is kept within the "low pressure" limit relative to earth, and the supply to "domestic" (viz., 230 Volts) between any one phase and the neutral for lights, fans and other small electric devices such as, refrigerators, heaters boilers, cookers, etc. The various domestic loads supplied at 230 Volts are nicely balanced equally amongst the three phases and the unbalanced current through the neutral conductor is kept minimum possible. At the same time this system enables power to be supplied also to "Industrial" consumers for driving motors, etc., in factories at 400 Volts, 3 phase.

Earthing of Neutral Conductor

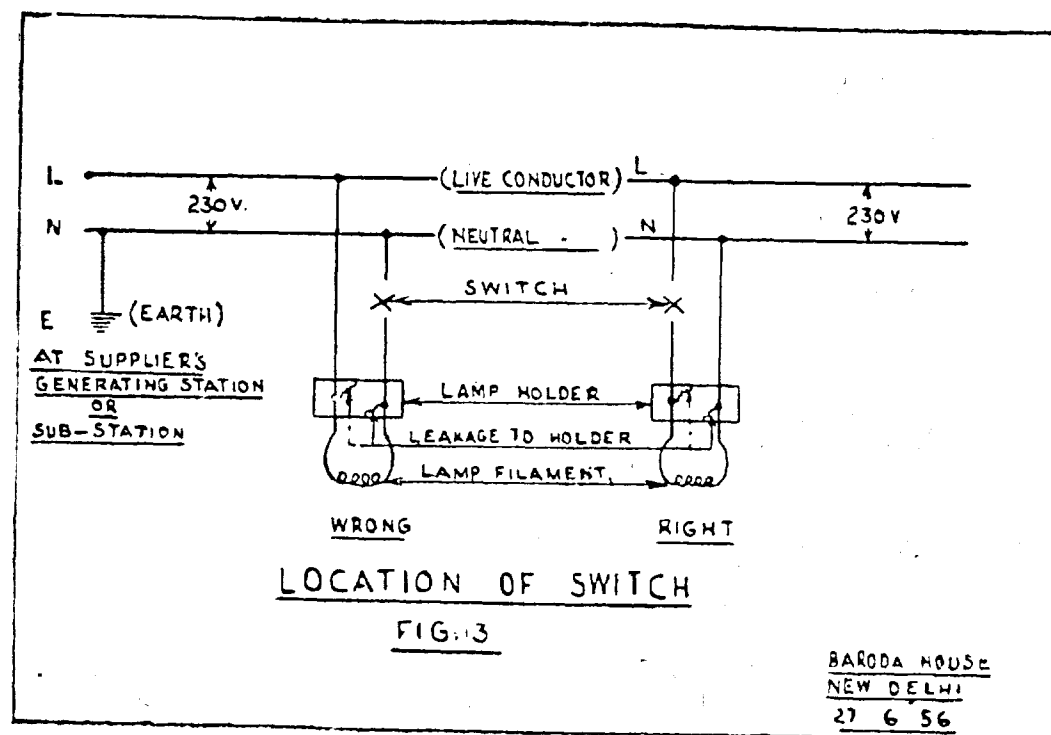
Under the Indian Electricity Rules, the neutral conductor shall be earthed at only one point—generally at the generating or sub-station of the supplier of electricity. Any break in the neutral conductor will not, therefore, ensure that portion of the neutral conductor after the break to be maintained at earth potential. A break in the neutral conductor is, therefore, unsafe and the insertion of a single pole switch or cut-out in the neutral conductor is prohibited.

Shock Risk

Now, any person standing on bare ground and touching any of the "phase" or "live", conductors of the above 400/230 Volts, 3 phase, 4 wire, 50 cycles A.C. system with neutral earthed, will get a 230 Volt shock, but if he touches the "neutral" conductor, he will not get any shock, as it is earthed. The Indian Electricity Rules, therefore specify that each "live" conductor shall be protected and controlled by a cut-out and a switch, whereas



the earthed neutral conductor shall have no cut-out or switch inserted in the consumers' premises unless it is linked switch so arranged as to operate simultaneously on the earthed "neutral" conductor and the "live" conductors. This is an important precaution and every consumer must ensure that all his single pole operating switches, cut-outs or fuses are inserted on the "live" conductor and *not* on the "neutral" conductor. A leaky lamp-holder will give a shock if the switch controlling the lamp circuit is inserted on the "neutral" side (and not on the "live" side although the switch may be "off". Under such a condition live power will reach the leaky spot either direct or through the load i.e., the lamp filament. On the other hand, if the switch is on the "live" side and is kept "off," there will be no shock risk involved, as the leaky spot will be in contact with the "neutral" conductor and therefore at earth potential. See Figure 3.



Mere solid earthing of the neutral point does not meet the situation entirely with regard to shock risk, as there are other sources of danger at consumers' premises and these are :—

Case (i) Insulation covering only

The insulation covering of a live conductor or part deteriorates and breaks down due to age or dampness or mechanical causes and such defective insulated

portion is directly accessible, or the live conductor or part itself becomes directly accessible.

Case (ii) Insulation covering protected by metallic enclosure

The live conductor or part of its defective insulation makes contact with the metallic enclosure protecting it and thus energises the metallic enclosure which is accessible.

(Continued on Page 36)

MARCH OF SCIENCE

Arc Welding Safety Devices

A new range of low voltage safety devices, for use with arc welding plants, has been recently introduced by Quasi-Arc Limited, famous suppliers of arc welding equipment.

It is possible to receive electric shock from accidental contact with live parts of welding equipment such as electrode holders. The effect, under normal conditions, is not serious but when working at a height, in cramped spaces or in wet surroundings, it could be hazardous. A device to obviate this risk, when using A.C. current in these conditions, has for long been advocated.

The functions of the new devices are to reduce the relatively high open circuit voltage to a safe value when the operator breaks the arc and to return it to normal striking voltage when the electrode again comes into contact with the workpiece.

A low voltage safety device, however, should not be detrimental to welding performance or to the natural characteristics of the welding set. If it makes arc striking difficult, or it is so sensitive that it operates with fluctuations of the arc, an operator may be tempted to discard the entire arrangement. These two problems have been solved in the new Quasi-Arc devices.

Three versions of the new device have been produced :

- (i) TYPE SD. 350—for use with single operator A.C. sets with an open circuit voltage range of 80–100 and a maximum output of 350 amps.
- (ii) TYPE SD. 450—similar to the SD. 350 but suitable for use with sets capable of giving currents up to 450 amps.

- (iii) TYPE SD. 450M—Specially designed for use with the regulators of multi-operator A.C. sets of 350 amps. and 450 amps. capacity.

The principle of operation of the three devices is identical and none of them interferes with the welding operation. They effectively reduce the open circuit voltage from 80 or 100 to 30 volts. The speed of response when striking an arc is such that even an experienced welder cannot detect the presence of the device. At the same time normal fluctuations of the arc do not cause the device to operate since the circuit incorporates a preset time delay. Correct operation of the device is indicated by a small low voltage neon lamp which is illuminated when the set is on open circuit at the reduced voltage. The lamp is extinguished when welding is in progress or should a failure occur in the device when the set is on open circuit.

The SD. 350 and SD. 450 versions are designed for attachment to the welding set and fitting of the unit to a set is a simple operation. A short length of cable is provided with a welding socket for attachment to the normal output plug of the welding set. The cable socket connected to the electrode holder is attached to the output plug incorporated in the safety device. Short T.R.S. cables are also provided for connecting the device to the supply terminals of the welding set and to the work/earth terminal. The units are extremely small and robust and are enclosed in sheet steel boxes, that of the SD. 350 measuring 12½" × 9½" × 4½" deep and weighing only 24 lb.

Quasi-Arc Limited of Bilston, England, are represented in India by an associated company, Indian Oxygen Limited, who not only supply

all Quasi-Arc equipment but also manufacture a comprehensive range of Quasi-Arc welding electrodes.

Explorer III Nears End, Gives Valuable Scientific Data

Explorer III, America's earth satellite now fast approaching a fiery death as it re-enters the atmosphere, has given U.S. scientists first and comprehensive knowledge about the intensity of cosmic rays in outer space.

Findings from scientific instruments aboard Explorer III as well as Explorer I, plus data from the visual tracking of the satellites, indicate that :

1. Cosmic radiation at higher altitudes is considerably more intense than had been anticipated.
2. Man can control the temperature in a space vehicle to make it easily acceptable for human survival.
3. Atmospheric density encountered by the satellite is several times greater than had been predicted in earlier calculations.

Explorer III, which has been orbiting for more than 90 days, is expected to plunge earthward shortly. It has travelled a total of 32 million miles since it was launched March 26 from a Florida testing centre.

At the time of the launching, the orbit extended out to beyond 1,700 miles and came to within 117 miles of the earth. Continuous data on cosmic radiation was obtained in this altitude range by a magnetic tape recorder inside the satellite. It transmitted the information back to a central point on earth.

Both of the transmitters in Explorer III have ceased to function, having fulfilled their life expectancy of about two months.

The satellite travelled approximately 361,500 miles during its first 24 hours in orbit. Scientists predicted that on the 90th day the earth-circling vehicle would travel 388,000 miles with an orbital period of 92.2 minutes, decreasing at a rate of three-quarters of a minute each day.

The apogee (the point farthest from the earth) of 375 miles was falling 60 miles a day.

Explorer III has been the first U.S. satellite to provide data representative of the entire orbit.

Officials reported that during May 1-7 the satellite survived an outer space battle as it raced through a swarm of micro-meteorites associated with the orbit of Halley's Comet.

When Explorer III plunged through the swarm of miniscule particles, two of its micro-meteorite erosion gauges (which measured space dust) were punctured, officials said. These were the first such ruptures experienced by a U.S. satellite. Evidence indicates these collisions caused other damage to instruments.

As part of its participation in the International Geophysical Year (IGY), the United States has two other satellites orbiting around the earth.

The six-inch Vanguard test vehicle was fired March 17 preliminary to the launching of a fully-instrumented satellite.

Explorer I, since its launching on January 31, has travelled about 52 million miles. The initial perigee (closest to earth) and apogee for Explorer I were 223 and 1,583 miles respectively.

Officials estimate the approximate lifetime of Explorer I at about seven years. They expect Vanguard I to stay in orbit more than 100 years.

ACCIDENTS AND HOW TO PREVENT THEM

[This article is based on the lecture delivered by Shri P. V. Viswanathan, Chief Inspector of Factories, in the Technical Training School on 6-6-58 and the safety circulars issued by him—Ed.]

Accidents do not happen, they are caused.

"Accidents interfere with Production. They waste man power, they spoil material, they cause disorganisation and waste of time. To the worker they bring pain and suffering, to his family they sometimes bring tragedy. Their prevention is Vital." "ROSPA."

There is a great difference between an accident and injury caused. It is wrong to count the number of accidents by the number of workers injured. It may be an injury to a co-worker or to an onlooker. An accident however trivial (according to the injury caused) might have been a major or fatal one in a slightly different circumstance or a few minutes earlier or after. The cause of every accident should be enquired into and remedial measures applied. This will remove or prevent a major or fatal accident.

A machine does not cause an accident, but causes an injury only. A greater percentage of accidents that are reported is due to human failings. Multiple mistakes of managements, supervisors—workers may lead to accidents, workers act from an acquired habit and they do not argue it out in every case why a particular job has to be done in a particular way except that they know that it is the usual method. They do not have any consideration for the environment and hazard in the different processes.

It is no use saying that an accident happened due to the fate of the injured person, or his carelessness or due to the machinery etc. The cause of the accident in each case can and should be traced by an enquiry which should be thorough in every aspect and remedy found out and applied.

An unsafe act and unsafe condition should be differentiated and properly understood. By an unsafe act a worker may cause an injury to himself or to any one else immediately he commits the act, whereas by creating an unsafe condition an accident may occur immediately or sometime later, if the unsafe condition is not removed immediately. To avoid unsafe conditions, good house-keeping and perfect shop floor maintenance should be aimed at. The following points may be kept in mind :

- (1) Propaganda.
- (2) Instruction and training of workers.
- (3) Admonition.
- (4) Use of personal protective devices and equipments.
- (5) Appointment of Safety Engineers.

Safety Engineers play an important part in devising proper equipment, fences and guards. The Welfare Officers should be told that they should look into better house-keeping.

The supervisors in factories are the most ill-equipped persons. They do not have the training necessary. Inspector of Factories, should ask the managements to arrange for meetings of the Supervisory Personnel in each or group of factories and he should himself address them on their responsibilities and duties. They should be made to realise that accident prevention work is squarely put on their shoulders and that they should instruct the workers to use the safety appliances etc. The supervisors should also find out if the workers are given the jobs which fit in with their ability and aptitude. If this is not done the workers' mind is not on this job and he is likely to meet with an accident. Inspector of Factories should devote more time in this

kind of work in order to reduce the number of accidents with a view to eradicate it completely. Every accident should be enquired into thoroughly and remedial measures applied. The managements will realise that the work of accident prevention, though it looks a bit of hindrance at the outset, will bring in good dividends.

In safeguarding machinery, the following 25 groups of dangerous parts as enumerated by Mr. H. A. Hepburn may serve as a useful list to be looked into by every Safety Engineer. In addition to this, there may be quite a number of dangerous parts that may require fencing and guarding and that is why the Factories Act specifically mentions that all dangerous parts of machinery shall be securely guarded.

The Twenty-five groups of dangerous Parts of Machinery

Experience has proved that the parts, or combination of parts of machinery given in this list are dangerous should unsafe acts be performed by persons in relation to them, or should an unsafe action develop in respect of their motion. They will cause accidents if not securely fenced or if not of such construction as to be as safe as they would be if securely fenced.

1. *Revolving Shafts, Spindles, Mandrals and Bars* : (Machine shafts, sensitive drilling machine spindles, chucks, drills, reamers and revolving attachments, radial drill spindles and drills; boring bars, stock bars and tubes; vertical traverse shafts on milling and other machines and the like).

2. *Inrunning Nips between Pairs of Revolving Parts* : (Gear wheels, friction wheels, calendar bowls, mangle rolls; metal manufacturing rolls; rubber washing, breaking and mixing rolls and others).

3. *Inrunning Nips of the Belt and Pulley Type* : (Belts and Pulleys; plain, flanged or

grooved; chain and sprocket gears; conveyor belts and pulleys; metal coiling cloth batching-up; paper reeling and the like).

4. *Projections on revolving parts* : (Key-heads, set screws; cotter pins; coupling belts and the like).

5. *Projecting Belt Fasteners and Fast Running Belts* : (Bolt and nut fasteners; wire pin fasteners and the like. Woodworking machinery belts; centrifuge belts; textile machinery side belting and others).

6. *Revolving Open Arm Pulleys and other discontinuous rotating parts* : (Pulleys; fan blades; spur gear wheels; and the like).

7. *Revolving Beaters, Spikes Cylinders and Drums* : (Scrutchers; rag-flock teasers; cotton openers; laundry washers and the like).

8. *Revolving or Oscillating Mixer Arms in Casings* : (Dough mixers; rubber solution mixers and the like).

9. *Revolving worms or Spirals in Casings* : (Meat mincers; rubber extruders; spiral conveyors and the like).

10. *Revolving high speed cages in Casings* : (Hdro-extractors; centrifuges and the like).

11. *Abrasive wheels* : (Manufactured wheels; natural sand stones and others).

12. *Closing Nips between Platen Motions* : (Letter-press platen printing machines; paper and cardboard platen machine cutters; some power press and similar adaptations).

13. *Nips between connecting rods or links and rotating wheels, cranks or discs* : (Side motions of certain flat bed printing machines; of Jacquard and other automatic looms and various other machines).

14. *Pawl and Notched Wheel devices for Intermittent Feed Motions* : Planer tool feed motions; power press dial feed tables and the like).

15. *Nips between Reciprocating and Fixed parts, other than tools and dies* : (Metal planer reversing stops; sliding tables and fixtures; cotton spinning mule carriages and back stops; pillars etc., shaping machine tables and fixtures; tool steady guide and steady arm on turret lathe; crossheads; slides and fixed parts and others).

16. *Nips between Revolving Control Handles and Fixed Parts* : (Traverse gear handles of lathes, milling machines and the like).

17. *Moving Balance Weights and Dead Weights* : (Hydraulic accumulators; counter balance weight on large slotting machines; and others).

18. *Nips between Revolving Wheels or Cylinders in Pans or on Tables* : (Sand mixers; edge runners; crushing and incorporating mills; dough brakes; mortar mills; leather carrying machines and others).

19. *Cutting Edges of Endless Band Cutting Machines* : (Woodworking band saws; log-cutting band saws; metal cutting and stone cutting band saw; cloth cutting band knives and the like).

20. *Nips between Gears and Rack Strips* : (Inker roller drives on L.L.P. and lithographic machines; some planing machine drives and the like).

21. *Revolving Drums and Cylinders—Uncased* : (Rumblers in the foundry; shaking barrels; barrel type dough mixers; varnish mixers; rag digesters and the like).

22. *Nips between Fixed Parts and Unidirectional Moving Parts* : (Buckets or hoppers of conveyors against tipping-bars; stops or parts of the framework).

23. *Revolving Cutting Tools* : (Circular saws; milling cutters; circular shears; wood slicers; routers; chain mortisers; chaff cutters and the like).

24. *Reciprocating tools and dies* : (Power presses; drop stamps; relief stamps; hydraulic and pneumatic presses; bending presses; hand presses; revolution presses and others).

25. *Reciprocating knives and saws* : (Guillotine for metal, rubber and paper cutting trimmers; corner cutters; perforators and the like).

NOTE.—The reference to machines or uses given in each Group are merely typical for each and are not exhaustive. One or more of the Groups will be found on every machine so that by an examination of any machine with reference to the list of those which must be guarded in order to prevent accidents can be immediately discovered. They should be fenced securely by any of the Five Methods of Guarding** bearing in mind that a Fixed Guard should be used in preference to any other.

** (1) Fixed guards, (2) Automatic guards, (3) Interlock guard, (4) Trip guards and (5) Positional or Distance guard.

III. The following extracts from the lecture by Mr. R. E. Tugman may be very useful to every management and Safety Engineer to know why accident prevention should be given a top priority in factories :

A PHILOSOPHY OF ACCIDENT PREVENTION

1. Motives

(a) Three main motives :—

(i) Legal

(ii) Humanitarian.

(iii) Efficiency (incl. betterment of Industrial Relations).

(b) These demands are made on Management (except that to a negligible extent the wage earner has certain legal responsibilities). Therefore, accident prevention is mainly a management function.

(c) Management is responsible for :

(i) Compliance with law.

(ii) Health, Safety and Welfare of employees.

(iii) Provision of any finance necessary for safe working.

(d) Management is responsible for seeing things are right and if things go wrong. This is vital.

(e) 25% of accidents avoidable by Engineering methods. 75% of accidents avoidable by correct behaviour.

Management is to accept responsibility for both Engineering methods and correct behaviour.

2. Legal

(a) *Factories Acts* : Considered opinion of majority and demands certain standards of safety in the factory. Loosely-worded and intelligently administered. Provides *minimum* standard because majority opinion bound to lag behind best recognised practice.

(b) Accident Prevention is a legal obligation.

3. Humanitarian

(a) Good employer looks after health and welfare of employees, and equally he will look after their safety, quite apart from any legal obligation. Will do everything he can to prevent his men from being hurt.

(b) Accidents create bad industrial relation.

(c) Accident prevention is a humanitarian necessity.

4. Efficiency

(a) Accidents indicate Management has incomplete control of what is going on.

(b) An accident is something which interferes with the normal course of events.

(c) Accidents are a challenge to efficient management.

(d) Accidents cause damage to Plant and personnel and interfere with the rhythm of production.

(e) Accidents exercise a bad influence on morale.

(f) Accidents are wasteful.

5. Meeting the obligations of management

(a) Engineering Matters :

- (i) Factory lay-out.
- (ii) Safe Working Conditions.
- (iii) Machinery Guarding.
- (iv) Removal of "booby traps."

Good Engineering design is the real answer.

(b) Personal matters :

(These are even more important, as a well-trained man is safe in almost any conditions.)

Management must, by some means or another, ensure correct behaviour [see para 1 (e)]

This may be achieved by—

(i) Ensuring that top management is 'sold' on safety. Safety Officer's job is to help management to do their job. Not to do management's job for them.

(ii) Safety Officer inspiring and maintaining enthusiasm of management when given a lead by the Works Manager. This enthusiasm must permeate the whole structure of management and supervision down to chargehand level.

(iii) Giving chargehands opportunities to talk to their men on safety matters and thereby to influence them along the right road.

(iv) Ensuring every man receives adequate technical training.

(v) Providing and enforcing regulations for the *safe* working of efficient production.

(vi) Emphasising that the word safety is only one ingredient of efficient production and that without it no individual or works has any claim to be called "skilled" or "efficient."

(vii) Ensuring adequate supervision.

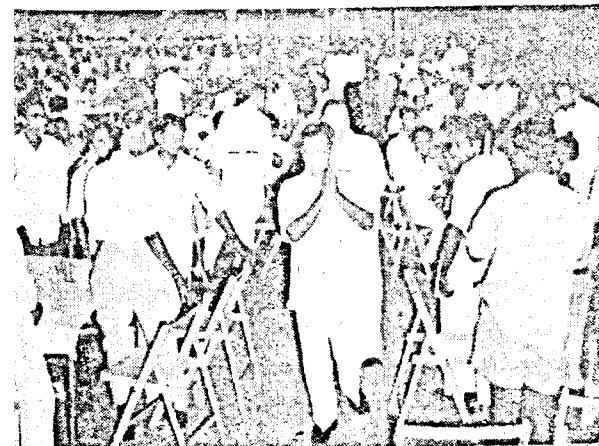
(Continued on page 34)

FAREWELL TO SHRI RAJAGOPALAN

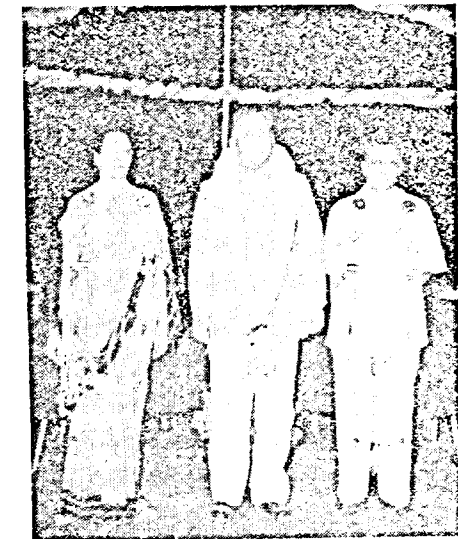
A committee formed from amongst the elder members of the I.C.F. family organised a grand farewell in honour of Shri Rajagopalan on the eve of his transfer to Delhi as Joint Director/Standardisation. The function was held on the evening of 17th June 1958 on the lawns in front of the Apprentices' Hostel, which was tastefully decorated. The farewell was attended by all the Swiss and Indian Officers and staff of the factory and the gathering numbered well over 750.

Shrimathi and Shri Rajagopalan, on arrival, were received by Shri Gadgil and the Reception Committee conducted them to the lawns, where the Tea Party had been arranged. After tea, Shri Rajagopalan moved around the gathering taking leave of those present.

Shri Swarup, who presided over the function and Shrimathi and Shri Rajagopalan were conducted to the specially erected shamiana. After prayer by Kumari Visalakshi, Clerk, CME's Office, Shri Nyamatullah, Chargeman, Shop 30, read and presented the farewell address in English. Then Shri K. S. Pattabiraman, Senior Clerk, Dy. CME's Office read and presented a farewell address in Tamil. This was unique in that it was the first occasion a farewell address was being presented in Tamil



Shri Rajagopalan taking leave of staff



Shrimathi and Shri Rajagopalan with the C.A.O. (R)

and that too the farewell address was in high flown language and rendered in a masterly fashion.

Shri Raman, Clerk, CME's Office, Shri Babu, Chargeman/Electrical and Shri Muthiah, Clerk, paid glowing tributes to Shri Rajagopalan.

Shri Swarup, who spoke next observed :

"We have assembled here today to bid Farewell to Shri Rajagopalan on the eve of his transfer to Delhi as Joint Director, Standardization. Shri Rajagopalan has been with us now for about 24 years and has been mainly responsible for the scheme to develop furnishing of shells in the I.C.F. He has put in very hard work, and by dint of his perseverance, organizing abilities and drive, has seen to the establishment of the Interim Furnishing Unit. It is a matter of no small pride that tomorrow we will be turning out the 100th Furnished

Coach, which will be going out about 4 months in advance of the schedule. If it is borne in mind that Shri Rajagopalan has got this job pushed through without proper facilities as the Shell Side had, depending largely on the trade to supply the various components, sub-assemblies and timber, his achievement becomes much more remarkable. We can be justly proud of it.

Shri Rajagopalan has had a most brilliant scholastic career and he proved his mark in Jamalpur also by standing first in the A.M.I.Mech.E examination, winning a Gold Medal. Mechanical Engineers trained in Jamalpur are very proud of him and I am sure that in his new assignment his scholastic brilliance and sound technical knowledge will bear him out as an outstanding man of whom the whole of India can be proud. We shall then have our own satisfaction.

Shri Rajagopalan is a most charming individual with a very broad outlook and is always willing to help others. One can hardly see him lose his temper, but in his own way he is persuasive and firm. To get an officer of this type who is thoroughly dependable is a piece of luck for all of us and we will be all sorry to lose him.

The Furnishing Side will find a team without an oarsman who was steering them out of difficulties and guiding them at every stage. "To change horses in midstream" is going to be a setback, but I am sure with your enthusiasm and with the team spirit that exists in the I.C.F. we will do our best to overcome this hurdle and contribute our mite to the task that lies ahead of us.

Shrimathi Rajagopalan and their children have also been very popular and have taken considerable part in the cultural and social activities. Shri Rajagopalan's elder daughter played a leading part in the Drama "Katta Bomman" that I.C.F. staged in Delhi during the Railway Week.

May God Almighty grant him the necessary guidance and always shower His choicest blessings on him and his family. Before I conclude I would again like to add that we will miss him tremendously in the I.C.F., but I suppose his transfer was inevitable in the larger interests of the country. I would now wish him on your and my behalf, all the best in his new career. I would offer my good wishes to Shrimathi Rajagopalan and their children for all the best in life."

Shri Rajagopalan rising amidst cheers said: "You have just heard quite a lot of good words spoken about me. It may not be quite correct for me to refute any of them and so with all humility I accept them. I am grateful for those kind words spoken.

I would like to mention on this occasion without taking much of your time, of my own short experience with the I.C.F. Although I was connected with the I.C.F. ever since its inception I did not have the good fortune to continue the association so far as the Shell Factory is concerned. When subsequently I was called here, I was certainly very happy, but that was without any knowledge of what the I.C.F. was actually like. But when I did come here and found the I.C.F. as it was,



Shri Rajagopalan delivering his speech

how should I say how much more happy I was. The factory, as you know, was built up actually as I would put it on one and a half legs. I have the good fortune to be brought in and to be made the instrument of finding the other half-leg. We have found it and it has come to me. With the atmosphere in the I.C.F., with the co-operation and incentive given by the development of this factory on its present so well infrequently admitted standard, I may without offence place myself with some credit in bringing out a little novelty in the project that we have also started an interim furnishing. This was made actually to catch up on the Shell Factory to what extent we can. I am also very glad that we have been able to achieve the establishment of the interim furnishing to the extent that we have already done 100 coaches with temporary facilities, which swayed and which had to be developed. But I would also like to mention very publicly that such an achievement was mainly the science of the traditions and the qualities that have been developed by the I.C.F. That it was there was also my good fortune and therefore we could achieve the same. The main reason that every worker in the factory worked as part of one unit is also evident in today's function that so many of you directly concerned with me and also not so directly concerned with me, have come together. This particular spirit is what I would like to emphasize over and over again.

I have been in Indian Railway Workshops, I have seen a few others also, but the I.C.F. has certainly evolved a new tradition, a tradition of the future. That it has changed even some of the people, who have come from the Railways from other places with their own traditions is a tribute to the stability, to the

inherent quality of that tradition. Now I would mention here that I shall certainly pray that this tradition should improve, should continue and as other factories catch up that, this factory will still lead building up further new traditions.

This particular atmosphere that I have mentioned has been an unique experience and that I have had it, I should certainly be very proud of it. This besides others is a reason that I am particularly sorry to leave this at present. But I feel certain that what has been sown here will grow and grow in fertile soil and so luxuriously and I will still continue to be able to say that I have been with the early part of this growth.

I am now transferred to Delhi on a somewhat different assignment, where I would not have contact with a manufacturing unit, but I shall be fully concerned with manufacturing units and I hope I will be able to induct on that contact to carry and use my experience with factories such as this so that from the Design office comes such that the factory will be proud of to produce.

In conclusion I would also again repeat that I am very grateful for what has been said of me. I am extremely grateful and very happy to see such a response today and I will express my wish for a good life and happiness for each one of you and in a team greater prosperity and greater achievements of the factory."

Shri Sugavaneswaran DCOS, proposed a vote of thanks. After paying a tribute to the qualities and abilities of Shri Rajagopalan he made special mention of the splendid work put in by the organisers in getting up the function on such a grand scale.

VISITORS TO THE FACTORY

M/s. Peter Wright and D. W. Jeffries, Economists of the World Bank, paid a visit to the Factory on the 2nd June, 1958. The distinguished visitors were received by the C.A.O. (R) and conducted round the workshops, the Technical Training School and the site for the Furnishing Annexe. They were thoroughly impressed with what they saw and at the conclusion of the visit Mr. Wright remarked that the I.C.F. remained a model of what would one day be a typical Indian Factory and that it provided an example to be emulated in other parts of the country. Mr. Jeffries observed that the I.C.F. had a well conceived plan for building not only coaches but efficient men. As a memento of their visit, model integral coaches were presented to the distinguished visitors on behalf of the workers of the factory.

A team of Soviet experts who are in the country in connection with the preparation of detailed project reports for the heavy machinery and coal mining machinery plants to be set up by the Government, visited the I.C.F. on the 10th June, 1958. They were taken round the shops and the Technical Training School. At the end of the visit they were pleased to record in the Visitors' Book as follows :—

"The factory produces a fine impression. There is no doubt that the construction of this Factory is a great achievement of the Indian people."

"We wish to the authorities and to all the personnel of the factory the furthestest success in their work as it increases the welfare of the peaceful Indian people."

"Simultaneously, we stress a great warmth which was caused to us by your engineers when our visiting the factory."



A team of Soviet Experts visited the Factory on 10-6-58

In lighter vein

RAILWAY PASSES: A THOUGHT

BY

S. NARAYAN

It is always a pleasant pastime for one and all to reflect upon the past and it is more so especially in my case. For me it is a joy and a solace when I think about the college days, the colourful life of mirth and jollity, the fond hopes of future and the irresponsible carefree present. Those things belong to the past, a dream dreamt, never more to return. During one such hedonistic escape into the realm of reflections I felt a pleasurable thrill recollecting those good old days and particularly of Father M....., his scintillating intellect, his wits, and puns : for every problem of life, he had his prescription ; for every anomaly, a satirical gibe.

Once apropos of passes he humorously remarked with a provocative twinkle in his eyes : "Railways will gain considerably if it is Christianised." Bewildered, we asked who it could be. Then he gave a list of Biblical

quotations arranged as a calendar in the following manner, which he said, Railways as a true Christian cannot but follow and follow them lucratively :

MONDAY—"Thou shalt not pass." (Num. 20 : 18).

TUESDAY—"Suffer not a man to pass." (Jud. 3 : 28).

WEDNESDAY—"The wicked shall no more pass." (Nah. 1 : 15).

THURSDAY—"This generation shall not pass." (Mark 13 : 30).

FRIDAY—"By a perpetual decree it cannot pass." (Jer. 5 : 22).

SATURDAY—"None shall pass." (Isa. 34 : 10).

SUNDAY—"So he paid the fare thereof and went." (Jonah 1 : 3).

Monthly Outturn

		Target figures		Actual figures	
		K.D. coaches	Indigenous coaches	K.D. coaches	Indigenous coaches
June, 1958		5	18	7	22
Cumulative total for the first 3 months of the year 1958-1959					
		15	50	19	63

(Continued from Page 28)

(viii) Ensuring that the interest and co-operation of wage-earners is created and cultivated by every possible means, such as incentive schemes, propaganda and appeals to pride, self-interest and competitive instinct, etc.

(ix) The use of Safety Committees, Production Committees and Managerial Committees.

(x) The main safety "weapons" are :—
Good LEADERSHIP
Adequate SUPERVISION
Firm DISCIPLINE

6. Conclusions

(a) All but a very few accidents are avoidable.

(b) Prevention of accidents is the responsibility of management

(c) Number of accidents that occur in a factory is in direct proportion to the determination of the management to prevent them.

(d) See para 5 (b) (x)

IV. The following instructions are chiefly intended for the use of foremen and supervisors in accident prevention work :

1. When you make your daily rounds make them a hazard-hunting inspection as well. You have special opportunities to spot deficiencies and dangers. By neglecting to arrange for necessary guards or fencing you may lay both yourself and the firm open to legal proceedings.

2. Warn all your workers of dangers in their work and show them the correct way.

3. Try, in particular, to see your shop from the point of view of new workers. What is familiar to you will be fresh to them, and may need explaining.

4. See that new workers are put in the charge of an experienced hand. Some people

are much better than others at helping the newcomers. Choose the better ones.

5. Remember that new workers not only need telling ; they need watching as well. They may be clumsy or awkward, or, being new to the job, may not have clearly grasped the meaning of instructions. They can be a danger to others as well as themselves.

6. See that all workers comply with accident prevention rules. This applies particularly to such matters as wearing the goggles or protective clothing provided, to keeping guards in position and to not oiling or cleaning machinery in motion.

7. Instructions are sometimes disobeyed because people do not understand the really sound reasons that are behind them. Bear this in mind and be ready to explain.

8. If a worker in the shop is constantly running into danger, consider whether he could be transferred to work that is freer from risk.

9. The accident record in your department is a matter for your concern. Do all you can to keep the figures down.

10. Remember that tidiness is essential for the prevention of accidents.

11. See that all tools, machinery, and equipment are maintained in a safe condition. Don't let those under your work with defective or unsuitable equipment. Encourage the reporting of defects by having them put right as quickly as possible.

12. If men from another department are doing repairs or other work in your department, see that it is done safely and right and that they leave the place as tidy as they found it. You are responsible for the conditions in your department and have a right to insist.

13. See that all guards and safety signs are replaced securely if they have to be moved.

14. If there are fire appliances in your department, it is your duty to keep an eye on

them, no matter what routine inspections may be made by another department. You are the only person who can ensure that they are always accessible. Remember that if they are obstructed "only for five minutes," fire is just as likely to break out during those five minutes as at any other time.

15. Ordinary and emergency exits, and the approaches to them, must always be clear. Be sure that you know what to do if fire breaks out.

16. See that all workers have all cuts, scratches and punctures dressed at once. Remember that a small wound may be just as dangerous as a large one.

17. Do not let an employee who feels ill remain at work. Apart from all other considerations, there is more liability to accident when people feel below the mark.

18. In the event of a serious accident when no one trained in First Aid is at hand, don't let the patient be mauled about. A lot of harm can be done by unskilled handling, however well-intentioned. Serious accidents need skilled medical attention.

19. Make it your business to see whether you cannot think of ways of reducing accident risk in your department. Suggest them to your Management.

20. Workers who are actually doing a job can sometimes see hazards or ways to avoid them that others do not. Encourage suggestions therefore and see that employees get the credit for them.

21. The attitude of those in the shop towards accident prevention depends upon the example that you set.

Safety rules and hints

1. Always obey instructions. If you are not clear what you have to do, ask your foreman or chargehand.

2. Be tidy. The tidy worker is a careful worker. A careful worker is a safe worker.

3. Get First Aid for even the slightest cut. A pinprick is often more dangerous than a severe cut.

4. Make proper use of all safety devices and guards provided. They are there for your protection.

5. Never clean or oil a machine in motion. Stop the machine first. Special rules apply to women and young persons.

6. Never remove a guard from a moving machine, and never operate a machine until the guard is in position. The guard protects you, not the machine.

7. Always wear sensible clothes and shoes. Loose sleeves and other loose clothing are dangerous. Worn-out shoes and high heels may cause an accident.

8. Lift the correct way. Bend your knees, not your back. Never attempt to lift a load that is too heavy—get assistance.

9. Always walk. Never run in the factory, and watch your step on wet and slippery floors. Use the gangways and do not take short cuts.

10. Never interfere with electrical equipment. If there's trouble, get the electrician. He knows what to do—that's his job.

11. *Factories Act* : Remember that although your employer is required by law (the Factories Act) to provide appliances for your safety, health and welfare, you are also under an obligation :

1. To use such appliances.

2. Not to interfere with or misuse such appliances.

3. Not to do anything wilfully or without reasonable cause which may endanger yourself or others.

12. *Special rules* : In certain areas of the works special rules are laid down for safe working. These must be implicitly obeyed.

I.C.F. THANKSGIVING SERVICE

The Second Annual Celebration of the I.C.F. Catholic Employees was celebrated with great eclat on Sunday, 15th June, 1958, at Our Lady of Lourdes Shrine, Perambur, Madras.

The celebration commenced with a car procession of St. Joseph (Model of Workers), followed by a solemn High Mass sung by Rev. Fr. Joseph Sandanam, S.D.B., Parish Priest. General Communion and singing of the *Te Deum* with Benediction of the Most Blessed Sacrament concluded the church service.

The members then adjourned to the E. & A.I. Railway Institute, Perambur, for a hearty Chota Hazri where about 150 members were present.

The First Annual Report of the Association was presented by Mr. I.S. Storey, Secretary, after which, Rev. Fr. Joseph Sandanam addressed the gathering.

The function came to a close with a vote of thanks by Mr. L. W. Brown, Chairman, followed by the members singing a hymn to St. Joseph.

(Continued from Page 22)

Precautions

The precautions taken to obviate the above dangers are—

Case (i) To use proper insulation for the live parts to suit the operating conditions at site.

Case (ii) To enclose the insulated live parts in a strong metallic cover and effectively earth the metallic enclosure.

Earthing of Metallic Cover

Unfortunately, however, this earthing arrangement has not always been effective under actual operating conditions for the following reasons :—

- (1) The consumers' earth electrode resistance cannot be kept low enough to give an effective earth.
- (2) A discontinuity in the earth wire will give no safety from shock in the event of a fault.

Fire Risk

On the other hand, with a low earth electrode resistance and a dead short or low resistance earth fault, the fault current can be so high as to produce a hot point in the earthing circuit which is likely to cause fire. This is particularly so in the case of high current carrying capacity circuits which will permit the passage of heavy leakage currents under no-load or light-load conditions before the overload protective gear can act and isolate the circuit affected.

Good Insulation

The ideal arrangement is, of course, to provide good insulation for all live parts and protect it with a strong tough enclosure which is not an electrical conductor and is non-inflammable and unaffected by moisture, etc., in which case no earthing will be necessary. Plastic is such a material now coming into vogue. Even with good insulation, the shock risk is not entirely eliminated on account of surface leakage. Under certain climatic condi-

tions with humidity high, as during monsoon-weather, particularly on sea coast areas, a touch of the insulating material covering a live part (e.g., bakelite switch covers) may give a nasty shock due to surface leakage. Such insulation coverings should be wiped off dry (after cutting the supply) and then handled. In any case, until a perfect insulating material strong and tough for giving the necessary mechanical protection is produced at an economic price, metals, such as, iron, lead or aluminium will continue to be used as a protective cover to the insulation of live parts and conductors of electricity and it will be necessary to adopt earthing of such metallic covering in order to prevent shock risk.

Earth Leakage Trips (See Figure 4)

A school of thought advocates the provision of earth leakage potential trip and earthing of the metallic cover through the trip. Under this arrangement the main supply on the live conductor is cut off by the action of an earth leakage trip, should the potential difference

between the metal frame of the apparatus protected and earth exceed a safe limit (say) 25/40 Volts. The resistance value of the earth electrode does not affect the tripping p.d. appreciably, which is an advantage.

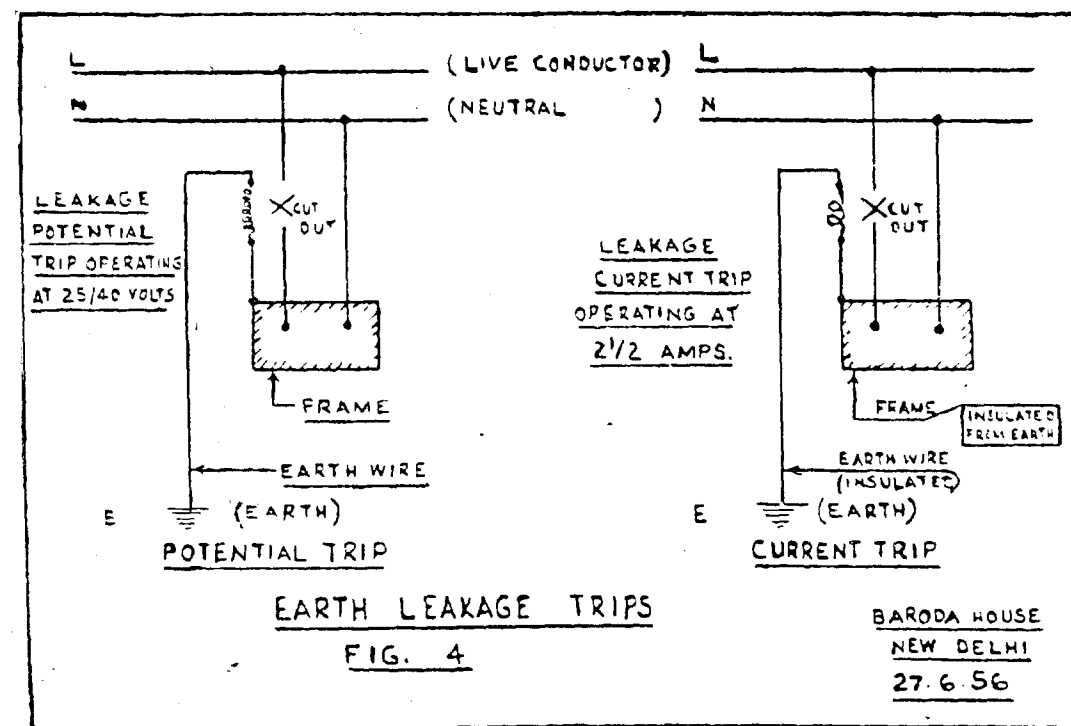
An alternative type of leakage trip operates on leakage current as shown in Fig. 4. This eliminates not only shock risk but also fire risk due to leakage current.

Responsibility of Supplier and Consumer

For any scheme to be effective, the Supply Authority as well as the Consumer will have to share a certain amount of responsibility and co-operate for its proper working. Briefly the essential requirements can be put down as follows :—

(1) Supply Authority's Responsibility

It is the supply authority's responsibility to maintain the neutral at earth potential. Neutral should be earthed only at one point at the source of supply ; otherwise it shall be insulated throughout its run. It shall be designed to carry only the



legitimate out-of-balance power current and not the leakage current which is illegitimate out-of-balance current and therefore should be kept under control and suppressed. As the availability of a good earth is essential to every consumer of electricity, it should be the supply authority's responsibility to furnish not only "insulated current" but also a "good earth" to each consumer connected to its system.

(2) Consumer's Responsibility

It is the consumer's responsibility to maintain his system properly insulated and earth all metallic enclosures not carrying power current. He should also limit the leakage current of his system to a minimum permissible value by providing necessary arrangement to cut off supply to the faulty circuit.

Neon Pencil

Potential indicators are also useful for checking purposes and act as a visual warning.

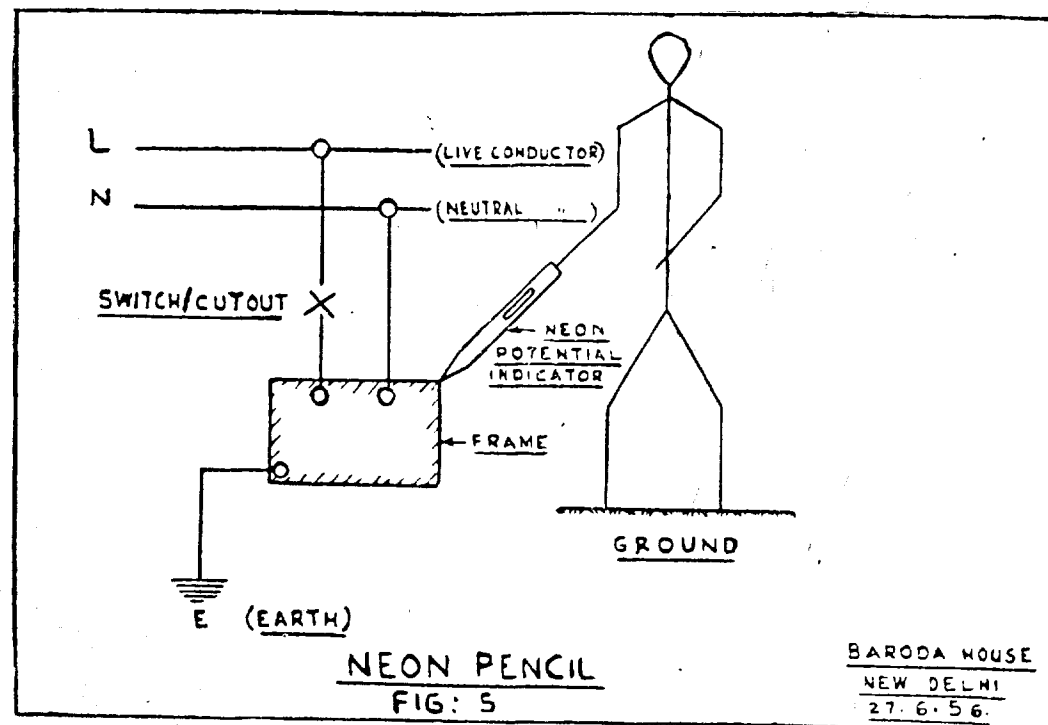
Consumers should get into the checking habit. A Neon pencil costs little but is a very useful potential checking instrument which can be easily handled. (See Figure 5).

Lower Safe Voltage for Portable Appliances

If a consumer can afford it, he may have his own double wound 230/115 or 55 or 24 Volt single phase transformers merely for the purpose of isolating (from the supply authority's 400/230 Volt neutral earthed main distribution system) his own distribution system inside his premises, particularly for feeding portable appliances such as, table lamps, table fans, electric iron boilers, etc. The secondaries of these "isolation transformers" need not be earthed, as low pressure unearthed isolated systems will go a long way to minimise shock and fire risks with proper overload protection.

Safety Hints

A few safety hints are given below for the benefit of domestic consumers on 230-Volt supply :—



- (1) Use always good insulation for your wiring and equipment. Purchase electric materials only from reliable makers.
- (2) Switches or cut-outs shall not be inserted on the neutral conductor, but should be on the live conductor.
- (3) Do not attempt to earth the neutral conductor in your premises. The neutral conductor should be given the same respect as the live conductor.
- (4) Ensure effective earthing of metallic covering of electric conductors and appliances.
- (5) Use 3-pin plugs and check up earth connections carefully. Each plug socket to be protected and controlled by a proper fuse and a switch on the live side. Use interlocked switch plugs or keep the plugs located at a high level not less than 4' — 6" — above floor level — beyond the reach of children.
- (6) Do not lift or move portable electric appliances with power "on." Switch "off" power and earth the frame before shifting position.
- (7) Check the effectiveness of your earthing and insulation initially on every new connection and periodically (at least 3 times a year — before the advent of Summer, Monsoon and Winter) on

your existing equipment. Consult a good Electrician for this.

- (8) Check leakage, if any, with a Neon pencil after switching on, but before touching the metallic frame of the apparatus.
- (9) Cut-off supply and earth the points on which you want to work. If you have to work with power "on," keep yourself insulated and see you are on firm support. Dry wood, paper, cloth and rubber are good enough insulators for 230 Volts.
- (10) Do not handle electric switches, etc., with wet hands. Be more careful in handling electric gear inside bathrooms and during monsoon weather.

NOTE : The human body resistance when dry is normally about 80,000 ohms, but when perspiring or wet it may come down to even 5,000 or less. The resistance of an ordinary 60 Watt 230 Volt metal filament lamp is only about 900 ohms and therefore even a lamp in series with the human body across 230 Volts does not appreciably reduce the shock p.d. across the human body and the person will still get a serious shock through the lamp.

- (11) Do not lean against electric poles or stay wires thereto.
- (12) Do not play with Electricity. Respect it.

THE SEASONAL ISSUE

BY

M. V. B. S. SARMA

This month looks like a month of marriages. A good number of my young friends got wedded and practically there was a deluge of wedding invitations—invitations addressed to self, wife and the nephew, severally and conjointly. Sometimes acquaintances with whom you have not moved much, whom you have avoided not for any special reason but due not to get embroiled in too thick a friendship, have pressed you so much, that to turn down their requests looked palpably sacrilegious. Sometimes good friends, who even obliged you by asking for small loans, with intentions not to return *ab initio* completely forgot to put you on the mailing list and when they met you on the day after the fair, profusely apologised for not having extended an invitation. A hundred and odd excuses come swiftly to their rescue and they dole them out from the edges of their tongues so glibly that you think they are fit to 'lie abroad as Ambassadors.' This is so much about invitations.

A South Indian marriage is like an 'all star cast mythological fillum'; it caters to all tastes and leaves none dissatisfied. There are sonorous chantings of sacramental hymns by the purohitis for people who are so inclined, there are dance numbers, carnatic music programmes, veena recitals, violin debuts, items of Nathaswaram Katcheri or band, anyone to choose from, and lastly for the edification and enjoyment of College going boys, the recently imported and partially unsuccessfully indianized Rock 'N' Roll. It is an occasion when you can see so many belles in so many colours—indeed an orgy of colours. There is festive spirit in the flashing eyes, in the beating hearts, in the nimble feet and in the whole being. Every one is happy and every one feels la-ra-

lappa. Every one is busy, the fathers and mothers on the boy's side wreathed in broad smiles for having successfully negotiated a commercial-cum-technical collaboration agreement.....on the girls side the parents start worrying whether they have blundered into a deficit budget. The ever grumbling grandmother also is happy; she occasionally adjusts her white crown piece and looks at the couple trying to flash back her own memories of nostalgia on the mental screen.

The bridegroom is rarely allowed any time, even to surreptitiously—i.e., for people who are not valorous—whisper to the blushing and confused bride. Some one comes and thrusts himself forward and the bridegroom has to introduce "This is so and so." The girl smiles sometimes pleasantly, sometimes idiotically; she does not know this multitude nor perhaps has a desire to get to know. It is all convention and convention has got to be respected. In a marriage everyone is confused, everyone has occasional spells of dawning wisdom, everyone is happy and unhappy, there are exhilarations and annoyances for small pin-pricks. And it is late in the night when the bridegroom retires to bed utterly exhausted.

With the number of coconuts, you collect in these marriages, you can make a modest beginning of a small shop in the Kothwal Bazaar. Alternatively, you can draw up a proposal to start a coconut curing factory on the 'Small Scale Industry' scale. Then there are marriages which you attend straight from the office and if you have not given prior intimation in the house, you have to plead guilty to the charge before the august presence of the Home Minister, who, without hearing your

deposition, surcharged with emotion, becomes at once elocutionary, hortatory, expostulatory and admonitory. You can enjoy only the wealth of retrospection and according to your temperament, curse or bless the boy who was instrumental for your present misery, by blowing this coal betwixt Her Majesty and your Lordship.

This particular friend whose wedding I attended was of such architectural proportions that were leviathan in character. Sometimes, we, his friends, were filled with misgivings because for an Indian, he was of extraordinary height while perhaps in European countries, his height and gait would have fluttered many a maiden's hearts. Any way he was able to secure a partner and that is the end of the matter; he joins the glorious band of matrimonial martyrs. Now the whole thing has only an academic interest.

As I dragged my footsteps from the marriage pandal, I began to ruminate: what is a marriage after all? A mistake every body commits? To venture a definition anthropologically, it is a state when a biped becomes a quadruped. 'A young man married is a man that is marred,' so wailed Shakespeare. Shelly agrees with him *in toto* and declares, "When a man marries, dies or turns Hindoo, His best friends hear no more of him." It was only the other day, I came across a joke that if a man with six children marries a woman with eight children, it is not a marriage but merger. To cap it all, Johnson comes forward and puts forth a mighty and unassailable argument, that "marriage has many pains but celibacy has no pleasures."

At the different stages of evolution of the world, marriages also have undergone changes, far reaching changes. Yes, Customs change, traditions die and cultures metamorphose. An eight year old girl was a "Kanya" according to Manu, and now it looks she is one at eighteen. My grandmother who is eighty now was married when she was eight. At the muhurtham time, she had to be ferretted out, from her play mates. It is still one of her



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

unforgettable moments. The alliance in those days was considered *Matrimonium ad morgnaticam*, just because grandfather was keen on her. In spite of grandfather's one or two lapses the partnership had lasted, lasted well and we are all the evidence.

The Biblical dictum is "Go and multiply." To whichever theological angle, we may belong, that is exactly what we are doing. We have beaten Ramanujam, the Mathematics prodigy hollow. We went a step further. We not only multiplied, but also added, subtracted and divided (remember the Siamese Twins). The politicians are aghast at the super abundance of targets exceeding production. Ascribe any defect to our population budgets but they never suffered from over estimation. In our enthusiasm, let us not forget the contributing factor. What is it? The answer is obvious.

I always held the opinion, that every unmarried man is a potential son-in-law. The ceremony of a wedding releases this static energy for conversion into kinetic energy. As there are buyers markets and sellers markets, we in India have a sons-in-law market. If the bridegroom is the son of a Gazetted Officer, Class I, he has a special status. The boy also must be a qualified I.A.S. or fit to qualify. Certain professions like Lawyers, Doctors, Engineers, Covenanted Assistants in European Firms, are categories in the approved list. Periodically the schedule is amended and now it includes the Chartered Accountants also. The problem of finding suitable boys has become so acute that every day we see a formidable array of matrimonial advertisements in Newspapers. They add spice to the news. An advertiser who is aged 52, a bachelor desires to correspond with a virgin or widow of 42 and above. Who is this Rip Van Winkle?

How were marriages contracted in olden days before Caxton was ever born? The tradition tells us that parents with eligible daughters used to be on the wait. Bachelors after quali-

fying themselves from the University of Varanasi, used to trek back their way, homes. They were invited with all the hospitality of a Hindoo and, provided they were willing, the girls from the stock were foisted on them. Even now we have a convention called 'Kasi Yatra' as though to remind this custom. Now-a-days our boys do not go to Benares University as a matter of course, and even if they go, they get entangled in some involvement and book double berths for their return journey while their parents fondly wish such practices should be given a "wide berth."

Among the Kshatriyas, the Swayamvara type was in vogue. There was no bigamy act and even middle aged married men were "no bar." The girl came, with a garland, gracefully, and put it round your neck like a boa-constrictor, if you were the victim. If you were in the seat, it meant you were open for tender. When once you were garlanded, you were in for a life term. You could not get away even with 'liquidated damages.' If you ran away, you could be brought on extradition.

Sometimes a girl was awarded to the man who broke a bow, or who took an aim and a shot at whirling fishes called "Matsya Yantra." Whatever be the manner in which the marriages were contracted they were long lasting and there is no historical evidence of divorce.

As every marriage is not a failure, every marriage is not a success. For a marriage to be successful, it requires so many ingredients. It requires love, looks, tact, intelligence, compassion, understanding, education, money and what not. These things should be proportional. Any one, in more than required proportion is poison. 'A fair wife and a frontier castle breed quarrels.' You must be Gandhian in outlook. You should love even your enemies. If you have strong convictions like 'While thy wife's mother lives, expect no peace,' you are doomed for a failure. At the same time,

(Continued on page 47)

I.C.F. CHILDREN'S HOLIDAY CAMP

BY

A. VENUGOPALA MENON

Assistant Labour Welfare Inspector

During the summer holidays, a Holiday Camp was organised for the children of I.C.F. Employees, the expenses for which was subsidised from the Staff Benefit Fund.

The party of 29 children and 5 staff guides under the leadership of Shri T. D. Jayaram, our popular Welfare Officer, left Madras Central on the night of 27th May, 1958 by the Bangalore Mail. The venues of the camp were beautiful places of historical interest in Mysore State. After a pleasant journey under fine weather, the party reached Mysore the next day noon. After a hearty lunch and rest, we set out on a sightseeing trip of that "City Beautiful," Mysore and drove through the beautiful boulevards and visited the Lalith Mahal at the foot of the famous Chamundi Hills, where the high dignitaries visiting the State stay. Its spaciousness, marble and other ornamental works and the large halls without central pillars are really worthy of high tributes to its architects. Leaving Lalith Mahal, the children had an exhilarating drive through the wide and winding roads up the Chamundi Hills. Atop this hill, at a distance of 10 miles from Mysore City, stands the temple of Chamundi, the powerful diety of the Royal Family of Mysore. The temple can also be reached by foot by climbing about a thousand steps. The items of interest on the Chamundi Hills are the Maharaja's summer palace at the summit of the hills and the giant-sized Nandi, the sacred bull of Lord Siva, hewn out of a single boulder. From the hill top, one can really enjoy the sight of the wonderful landscape of Mysore City during day time and the vast array of lights during nights.

Early next morning, we left by train for Hassan, wading through beautiful valleys with blooming trees and green fields. One would really be struck by the contrast of the congested city life in Madras. Owing to the salubrious climate throughout the journey, the children never felt the strain and were all merry singing songs and cutting jokes. By mid-day we reached Hassan, the poor man's Ooty and left by bus to Sravanabelagola which is 32 miles from Hassan.

Sravanabelagola: This is a place of pilgrimage for the Jains all over the country. The world-famous statue of Gomateswara is situated here atop the Indragiri Hills also known as Vindhyagiri which is 3,347 ft. above sea level and 500 ft. above the plains. The colossal statue is about 57 ft. high and is cut out of a single boulder which probably rested on the spot. The statue which stands erect, is cut out of fine grained light-grey rock and looks surprisingly bright and clean, as if fresh from the chisel of the sculptor. This is one of the largest statues in the world. The face has a serene expression and the hair all over the head is curled in short spiral ringlets. The shoulders are very broad and the waist is small. This statue is said to have been made in 893 A.D. during the time of King Rajamalla. The statue stands at the centre of an open court surrounded by a corridor containing cells which is again surrounded at a little distance by a heavy wall. Gomateswara the Jain Saint who is also known as Bahubali in Northern India. According to legends, Gomateswara was the son of the first of the Thirthankara Kings, Purudeva and the brother of Bharata. There was a struggle for

empire between the brothers and Gomateswara generously gave up the struggle, renounced the world and became a saint.

At intervals of 14 years, a famous festival known as the Mastakabhisheka or the head-anointing ceremony is performed, when several lakhs of people from all over India attend the function. The last festival was held in 1953.

Opposite to Indragiri, stands the Chandragiri Hills, which also the children visited. There are several basties (Jain temples) and statues on the hills in the Dravidian style of architecture, said to have been built in the 8th and the 9th centuries.

The village of Sravanabelagola is situated between the Chandragiri and the Indragiri hills in picturesque surroundings. This is the main seat of Jain learning and of the principal Guru. According to inscriptions, the great Mouryan Emperor Chandra Gupta is said to have spent his last days at Sravanabelagola and that his grandson Ashoka had been there on a pilgrimage. The village is strewn all over with several basties, enshrining the images of Gods, Goddesses and saints.

Belur : The next day the children visited Belur, travelling a distance of 24 miles from Hassan by bus. The temple is built of soap stone which yields softly to the chisel. The stories of Ramayana, Mahabharata and other epics are depicted in the form of small images carved out of soap stones all round the temple walls, each image vying with the others in its richness of artistic grandeur. The surprising part is that many modern styles of dress, ornaments and make-up are seen among the carvings. Any visitor has to bow down his head in reverence to the artists whose dexterous hands worked such marvellous elaboration of ornamental sculpture. Amongst the images are seen many a Holy Cross, the sign of Christian Religion, although the temple is said to have been built 900 centuries ago. With the help of a local guide, it takes at least three hours

to get a know-how of the innumerable carvings in the temple.

Halebid : The party then left for Halebid, travelling a distance of 9 miles through hilly tracts, surrounded by beautiful valleys but devoid of human habitation. It was in the village of Halebid that the ancient capital of the Hoysala Kings, Dwarasamudra, stood. The village is said to have been founded in the 11th century. The Hoysaleswara temple is constructed of soap stone. According to inscriptions, the temple is said to have been built during the reign of Hoysala King Narasimha in the twelfth century. Splendid ornamental sculptures are carved out around the walls and inside the temple. But many of the images have been found damaged. Tandaveswara is the chief deity of this temple. There is a big image of Lord Ganesh in the south of the temple compound. There are a number of large images in and around the temple, depicting episodes from the Ramayana, Mahabharata, Bhagavad Gita and the Puranas. The temple is kept in a clean condition.

The *Kedareswara temple*, situated at a small distance from Hoysaleswara temple, is also a fine specimen of ancient architecture.

There are a number of basties (Jain Temples) also in the place, out of which the Parasavanatha Basti and Santinatha Basti are noteworthy. The pillars of this temple, hewn out of soap stones, have been so exquisitely worked out that they serve as fancy mirrors, showing the images of the objects in different forms.

On the morning of the 31st May, the children were taken to the Jagan Mohan Palace, Art Gallery and the Maharaja's Palace. While at Mysore, the children had a pleasant surprise when Shri T. Venugopal, our Personnel Officer visited them and spent some pleasant time with them. In the evening, the party set out by a special bus to Seringapatam and Krishnarajasagar. Enroute, the party got down to see the St. Phelomena's Church. The Saint's

Tombs in the underground cell is an exquisitely beautiful piece of work. The massive building is itself a fine structure of admirable architecture.

Seringapatam : Leaving the St. Phelomena's Church, the party reached Seringapatam locally known as Srirangapatna, an island formed by the river Cauvery. The town of Srirangapatna with its fortifications is said to have been built in 1120 A.D. by Udayaditya, the brother of Vishnuvardhana, the Hoysala King. It passed into the hands of Raja Wadiyar, the ruler of Mysore in 1610, and became the capital of the Rajas of Mysore and later on that of Hyder Ali and Tippu Sultan, until it was captured by the British in 1799.

The places of interest inside the fort are the temple of Sri Ranganatha, ruins of Tippu's Palace, the Mosque, the dungeon, the water gate, a few yards to the east of which Tippu met with his end and the ruined Swinging Arch of 112 ft. single span which had a strange swinging effect.

Dhariya Dhaulat : Outside the fort, is the Dhariya Dhaulat, the pleasure palace of Tippu Sultan. The walls have been lavishly covered with artistic paintings, representing among other historic scenes, the Battle of Pallilore, 1780 in which the British Forces were defeated by Tippu and the capture of Col. Baille. This mansion, the Garden House of Tippu Sultan, is also traditionally known as the residence of "Wesley Sahib" (Col. Wellesley) after the conquering of Mysore territories by the British.

Gumbaz : About a mile from the island stands the Gumbaz or the mausoleum of Hyder Ali, built by his son Tippu Sultan, in the midst of a beautiful garden. In the centre of this monument are the tombs of Hyder Ali, his wife Sydani Begum and Tippu Sultan. The pillars of this dome-like building are of black marble.

Krishnarajasagar : The party reached Krishnarajasagar, a distance of 12 miles from Mysore, the children singing and enjoying themselves all the way. The colossal Kannambadi Dam, 124 ft. high and 2 miles long, across the mighty river Cauvery, forming one of the largest artificial lakes in the world, stands here as an example of man's power to harness nature's resources for the benefit of humanity. Downstream of this huge dam lies the colourful Brindavan Gardens, with its fountains, terrace gardens, lawns, water channels, producing a wonderful effect. When illuminated during the nights, so colourful is the beauty of the place, that one is really lost in its splendour and feels as if he is in some fairy land. Really a Heaven on Earth, the gardens are crowded with tourists especially on Saturdays and Sundays.

The children who were lost in the beauty of the fairy land were very reluctant to leave the place. Though we left the place, an indelible impression had been left on our minds. Late in the same night, we left Mysore and reached Bangalore the next morning. After good rest, the children were taken round the city on a visit to Cubbon Park and Vidhan Soudha, the newly built wonderful building housing the State Legislatures and the Secretariat offices. It can be safely said that it has surpassed perhaps any public building in India. Such is its grandeur and fineness of architecture. A monument to its planner. At all times of the day and even in the nights, continuous stream of visitors go round to see its beauty, as if it is a treasure house of antics.

Leaving Bangalore on the night of the 1st June, the party reached Madras early on the 2nd morning and thus came the end of a short period of exhilaration which left a deep impression in the tender minds of the children of the glories of Mysore State.

Brain teasers

1. Two boys Billoo and Jiloo go to purchase books with their fathers Manna and Dhanna (not necessarily respective fathers). After the purchase is over it is found that each of the four persons has paid for each of his books a number of rupees equal to the number of books he has bought. Each family has spent exactly 130 rupees in purchasing the books. Manna buys two books more than Billoo while Dhanna buys two less. Who is the son of Dhanna and what are the number of books purchased by each individual?

2. A military officer wanted to punish 6 of his guilty soldiers but this he wanted to do with an appearance of impartiality. Hence he asked the 30 strong squad to stand in a circle and punished every tenth. Where were the guilty six when the circle was first formed?

3. Mani's age is three times the sum of the ages of his children. In eleven years time Mani's age will be equal the sum of the children's ages. If now, Mani's second child is quarter the age of first and double the age of the next, what are the ages of Mani and his three children?

4. The elected member from our mohalla once invited some of us who had acted as volunteers during the elections to a party in a local hotel. Before the party commenced, our group was taken for a trip round the city by our host in two motor cars, but unfortunately we could not enjoy this trip very well, as there was a feeling of overcrowding in the cars. Thereafter when the party was over our host handed over a currency note and the hotel manager told that still a naya paisa was due, which, much to the discomfort of the

host, one of us had to pay. How many of us were there in the party including the host?

5. There are two roads leading to Paharganj from Sagarpur and each of these two roads skirt a hill and climb up and down another hill but neither of these climb or skirt the same hill. Two cyclists starting at the same time from Paharganj take the two roads and reach Sagarpur at the same time. Assuming the skirting distances of the two hills are one mile and two miles, the speeds of the two cyclists are uniform at 6 m.p.h. up hill, 10 m.p.h. downhill and 8 m.p.h. on level, what is the difference in distances between the two hills? Assume the distance up and down over the same hill as equal.

6. Eighteen times (DO + OR) gives ODER. What do the letters stand for if the total of the figure formed up also number 18?

Solutions to last month's teasers

1. The soaps were exchanged at the end of the seventh day.
2. Six to one.
3. The winning list was Raja, Muthu, Siva and Anna.
4. Anna's mama's age is 47, his sister 44 and father 69.
5. Planning a funeral ahead is inherently improbable.
6. Mr. Driller is the shaper and his son learns milling.
Mr. Shaper is the miller and his son learns turning.
Mr. Turner is the driller and his son learns shaping.
Mr. Miller is the turner and his son learns drilling.

Wit and Whistle

(Contributed by K. S. PADMANABHAN, Graduate Apprentice)

1. The Judge glared at the defendant, "You are charged with forgery. What do you plead?"

"Not guilty. You know, Judge, I cannot even write my own name."

"That does not matter here, mister, you are not charged with writing your own name."

2. The case concerned a will and an Irishman was a witness.

"Was the deceased" said the Lawyer "in the habit of speaking to himself when alone."

"I don't know" was the reply.

"You should know that because you pretend as though you were intimately acquainted with him."

"The fact is" witness said angrily, "How could I be with him when he was alone?"

3. The Jail Superintendent came to the condemned prisoner and said, "this will be your last meal. To-morrow you will be executed. You can have whatever you want."

"I want watermelons" said the prisoner.

"Watermelons!" exclaimed the Superintendent.

"But you will get them only in the month of April. This is only September."

"Of course, I can wait" was the reply.

4. With great difficulty the newly appointed Jail Warden broke the news to the prisoner that he would be executed on Monday.

The prisoner on the other hand cheerfully asked the warden, "Why not on Saturday?"

The warden was rather surprised and asked the prisoner, "What is wrong with Monday?"

"Oh!" said the prisoner. "It is such a poor way of starting the week."

5. "What?" said the gay old man, "you want me to make a will. I have spent every rupee, I ever had and all I can leave behind is the earth."

6. Mr. Harrison was dying. His wife stood at the bedside jotting down his last wishes.

"The oldsmobile car, I give it to my oldest son, Dave."

"Why not to Solly. He could use it on his business" said his wife interrupting.

"Alright give it to Solly. One third of my business shares to Morris."

"Why not to Johnson? Morris would squander everything in a month."

"Alright' Give it to Johnson. All my jewels except what you are wearing should go to Miriam, my youngest daughter."

"Miriam hates jewelry. Give it to Sylvia."

The old man lost his patience. He shouted at his wife, "Hannah, who is dying? You or I?"

(Continued from Page 42)

you should not get away with the notion that you should not have strong convictions. If you do, you will fail miserably.

You must believe in G.B. Shaw when he says, "Every woman, who has not any money, is a matrimonial adventurer." You must always strike a balance. If you feel that my advice is confusing and it more hinders than helps, it can't be helped. You may laugh at me; I do not care, because I am married and I have been laughed at. I can only conclude by saying to those who are in the opposite camp.

"Choose not alone a proper mate.
But proper time to marry."

OUR FAMILY



Swaminatha RAMAN, our ace Table Tennis Player, joined the Coach Factory in August, 1955 as a B.T.-in-charge. He was promoted as Electrical Fitter in May, 1956 and is working in that capacity now.

Born in Madras 25 years ago he passed the Matriculation examination from the P.S. High School and later passed the diploma examination in Electric Wiring. After serving with Electric Engineering firms for about 3½ years he joined the Electrical Department of the Integral Coach Factory.

He is a Table Tennis Player of great repute and has continuously represented Madras State from 1951. He was awarded a Special Cup for best all-round performance in the Inter-Railway Table Tennis matches held last year. He is a good cricketer and plays in the "A" Division league.

His hobby is letter writing and he has a number of pen friends all over the world.



Dakshinamoorthy LOGANATHAN, an expert mechanic of the Civil Engineering Plant Park, joined the Integral Coach Factory in August, 1952. He joined the Plant Park as it was being formed and ever since has been rendering good work in the maintenance of all diesel and petrol powered plants of the Civil Engineering Department. He is an enthusiastic worker, and has put in commendable work during the construction phase attending to Cranes, Compressors, Pumps, Rollers, Mixers and Pneumatic Tools.

Born in Wallajabad 32 years ago, being interested in working with his hand, he left school early to qualify himself as a Diesel Engine Mechanic. After serving an apprenticeship of 2½ years, he worked for 4 years in an Army Technical Training Unit and later put in 4 years of service in the Agricultural department as a Diesel Engine Fitter.

He is a keen sportsman and captained the Foot-ball Team of the Civil Engineering department in 1954.

NEWS MAKERS

Our felicitations to :

1. Shri D. R. Naha, Assistant Electrical Engineer promoted District Electrical Engineer with effect from 9-6-58.
2. Sarvashri M. S. Srinivasan and H. C. D'Cruz, Foremen in grade Rs. 300-400 promoted Senior Foremen in grade Rs. 360-500.
3. Shri S. V. Krishnaswamy, Chargeman in grade Rs. 150-225 promoted Chargeman in grade Rs. 200-300 in the Production department with effect from 21-5-58.
4. Sarvashri S. Natarajan, G. Seshagiri Rao, K. Srinivasan and A. Raghavan, Chargemen in grade Rs. 150-225 promoted Chargemen in grade Rs. 200-300.



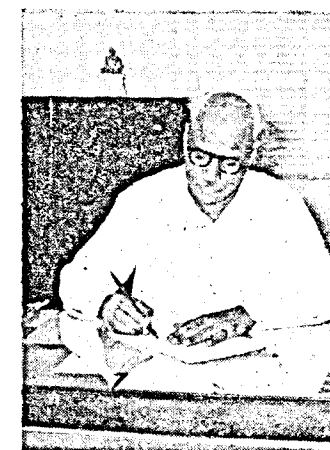
Shri D. R. Naha

Our Best wishes to :

1. Shri R. Rajagopalan, Deputy Chief Mechanical Engineer/Furnishing transferred to the Research, Design and Standardisation Organisation, New Delhi, as Joint Director.
2. Shri G. N. Upadhyay, District Electrical Engineer left on leave preparatory to retirement.



Shri R. Rajagopalan



Shri G. N. Upadhyay

DID YOU KNOW?



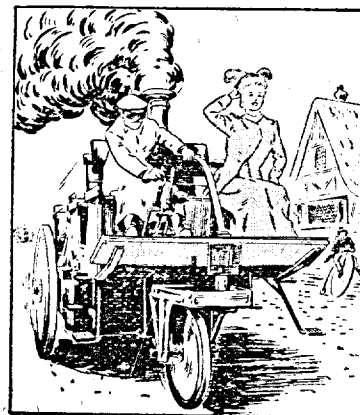
Carat for carat, a flawless emerald of good color is the world's most precious gem, and may cost in excess of \$ 2,800 per carat.



Due to the weaker pull of gravity on the moon, a strong man who could lift 500 pounds on the earth could lift 3,000 pounds on the moon. A seven-year-old child could break the high-jump records of Olympic champions. A large cannon could fire a shot completely around the moon.

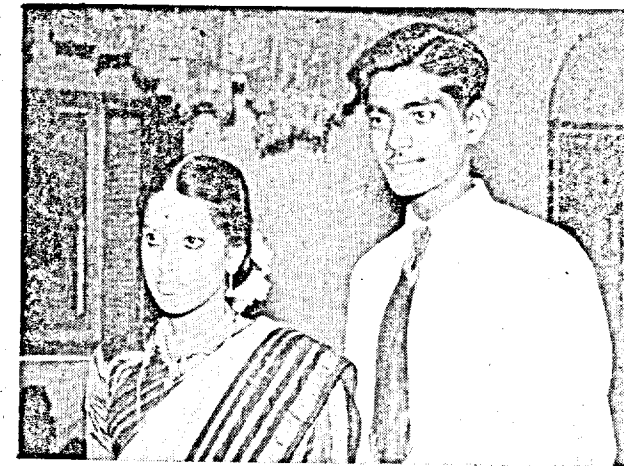


The almost total lack of atmosphere means that humans would hear no sound on the moon, but would be able to see more clearly than on earth. For this reason, astronomers dream of constructing observatories on the moon to get a better view of the universe.

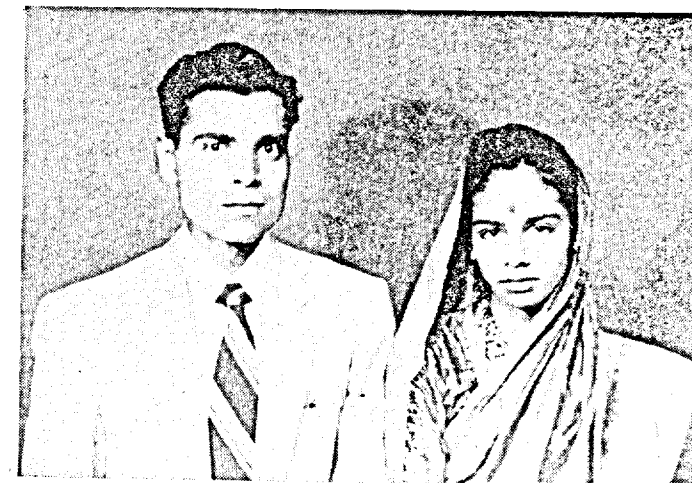


The Grenville steam carriage, built in 1875, the world's oldest automobile, is still in running condition. It was designed and built by R. Neville Grenville in Glastonbury, England.

WEDDING BELLS

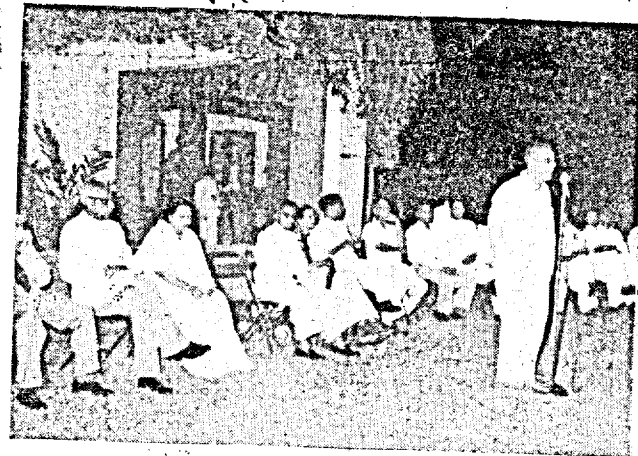


Shri V. Venkatapathy, Carpenter Apprentice was married to Kumari Vasanthakumari on 5-6-58 at Nellikuppam



Shri H. Y. Hosamani, Asst. Ward-Keeper was married to Kumari Kalyanamma on 8-5-58

OUR BEST WISHES TO THE NEWLY WEDS!



Shri Swarup addressing the gathering at the Farewell Party arranged in honour of Shri Rajagopalan, Dy. C. M. E.



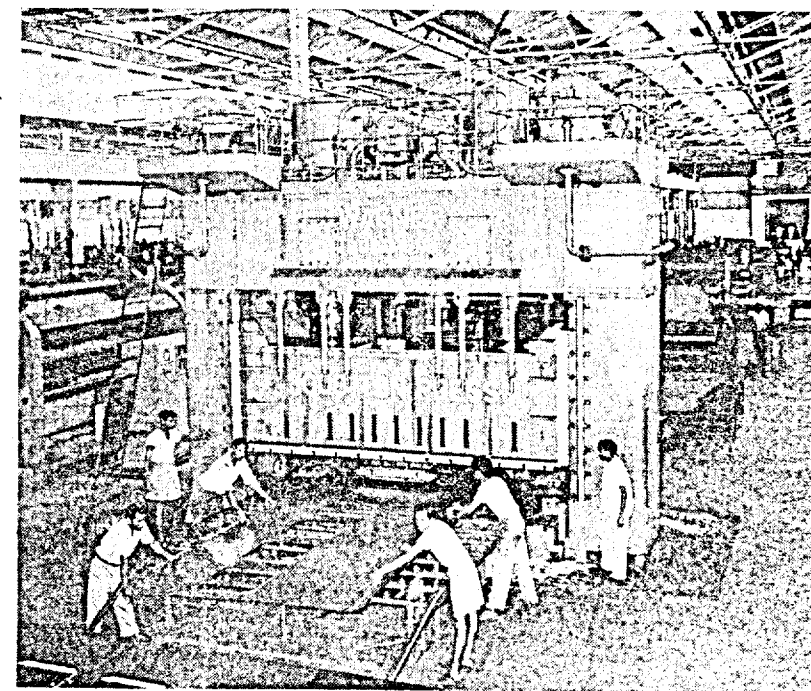
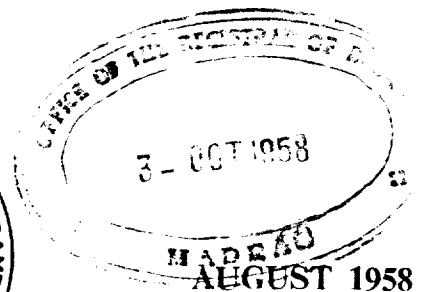
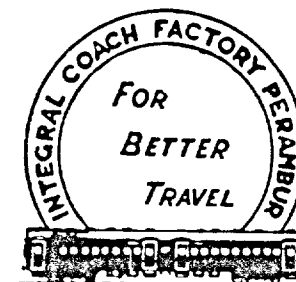
The World Bank Team with the C. A. O. (R) and other Officers in our lobby

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, Mad.

RAIL COACH

4213

VOL. II, No. 11



Window openings being punched in the side wall sheets.

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)		
Back	... Rs. 250	Mechanical Data	
Inside Front	... „ 200	Blocks	... Screen 100
Inside Back	... „ 200	Full page	... 8" × 5½"
SPECIAL POSITIONS—		Half page	... 4" × 5½"
Facing		Quarter page	... 4" × 2½"
(i) Front inner cover	... Rs. 150	Cover page	... Art paper
(ii) Back inner cover	... „ 125		one colour
Facing Editorial—		Inside page	... Imitation
(i) Full page	... Rs. 125		art paper
(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

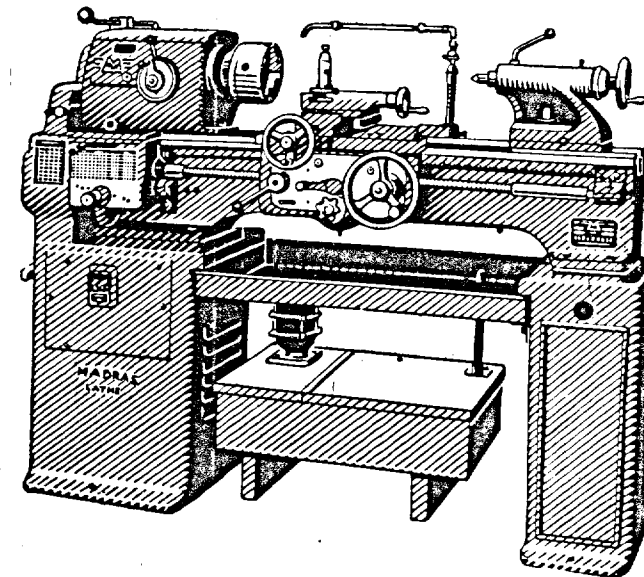
The Editor

RAILCOACH

Integral Coach Factory, Perambur, Madras 23



STREAMLINED LOOK BETTER PERFORMANCE



Strikingly modern in design, MADRAS LATHES (Height of Centre 165 mm, admits between Centres 750 mm) have many up-to-date features which include eight spindle speeds ranging from 48 to 1000.

Precision-built with best quality material these GEARED HEAD lathes have unusual strength to render perfect service for many years of regular operation.

Ask for illustrated details - a study of its features will convince you that MADRAS LATHES are unbeatable in their group for target production.

Thoroughly inspected and first graded by the Inspection Wing of the Government of India.

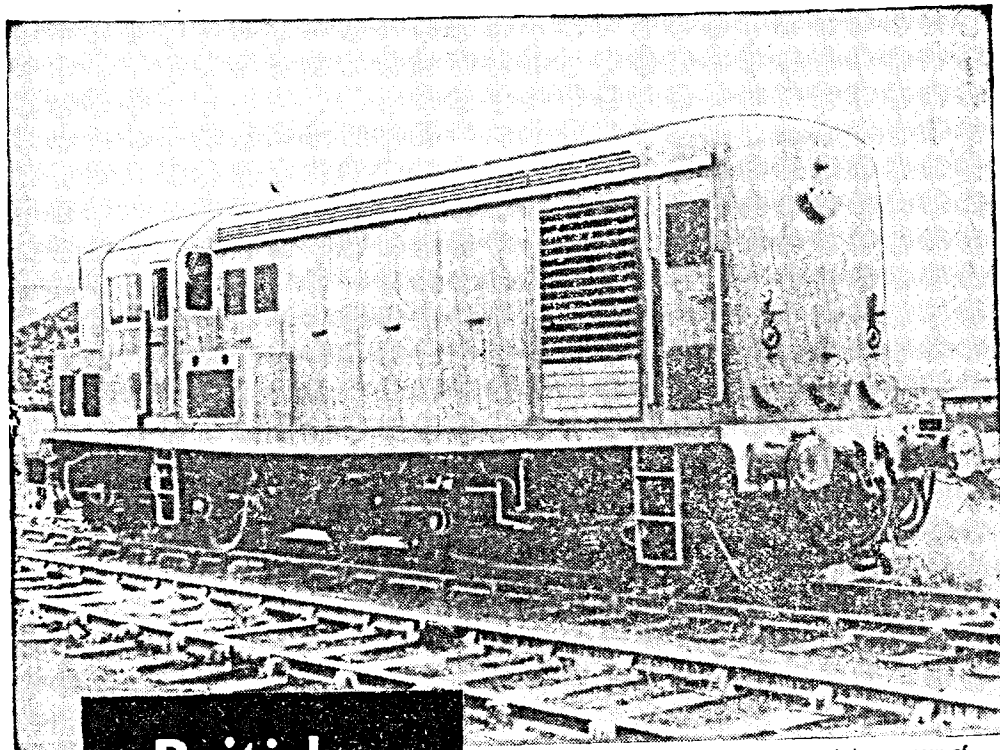
MANUFACTURERS:

THE MYSORE KIRLOSKAR LIMITED

YANTRAPUR P. O., HARIHAR.

SOLE DISTRIBUTORS:

BATLIBOI (PRIVATE) LTD.,
SILVER JUBILEE PARK ROAD, BANGALORE 2.



Photograph by courtesy of
British Thomson-Houston Co., Ltd.

**British
Railways
rely on
SKF**

**800 h.p. Bo-Bo diesel
electric locomotives
with SKF axleboxes**

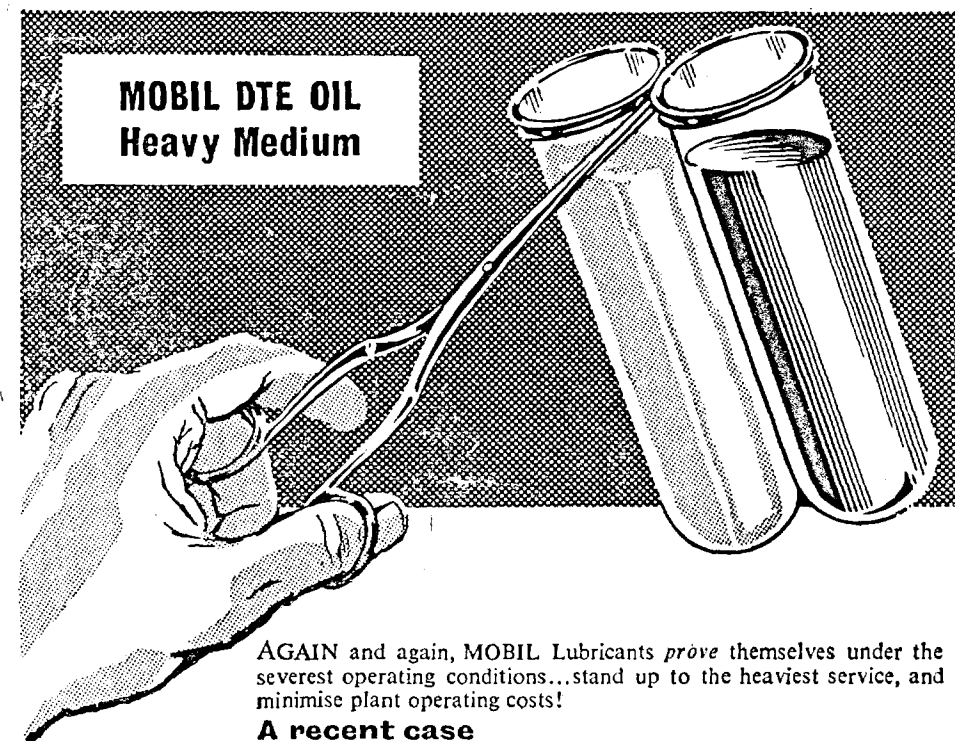
Illustrated above is one of ten 800 h.p. Bo-Bo diesel electric locomotives ordered from The British Thomson-Houston Co., Ltd., by the British Transport Commission and intended for main line freight duty on the London Midland Region of British Railways. These locomotives, which are now coming into service, are all equipped with SKF self-aligning spherical roller bearing axleboxes.

SKF

THE SKF BALL BEARING CO. PRIVATE LIMITED
BOMBAY P. O. BOX 71 • CALCUTTA P. O. BOX 588 • MADRAS P. O. BOX 66

N, 73

**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

V. 6528

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

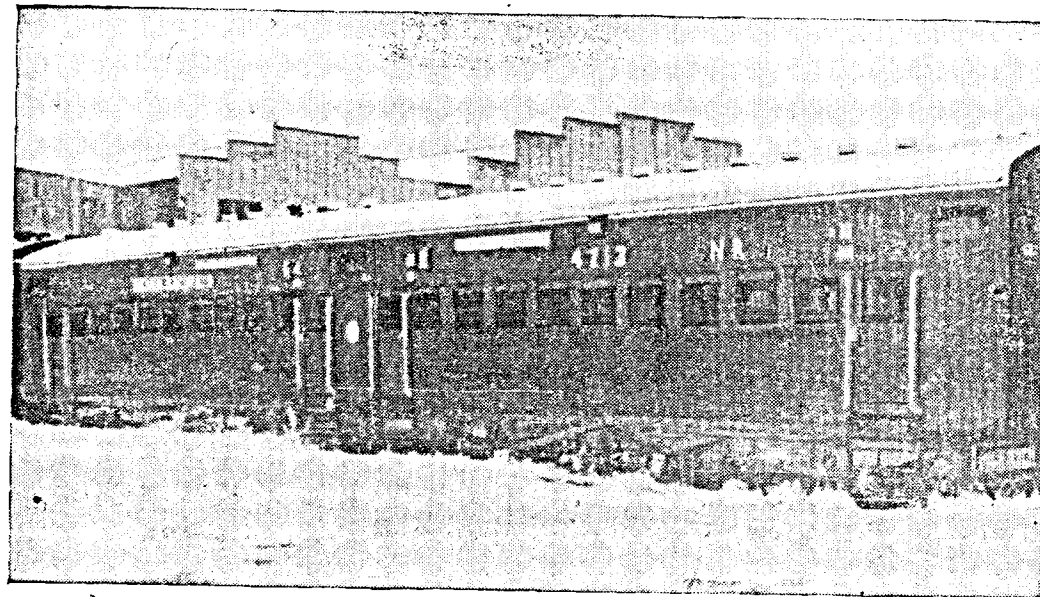
AUGUST 1958

	PAGE
Editorial	7
News and Notes	9
Increase your profits by work study	12
Supervision in Industry	14
March of Science	15
What is prestressed concrete ?	17
The importance of Grinding Wheels in Modern Industry	20
The ingredients of personal efficiency	24
News from Switzerland	27
Sports Folio	29
Number Please	30
A happy day at Thummurkonam Water Falls	33
Visitors to the Factory	35
Tangled Webs	36
A visit to literature in Rock	39
Brain Teasers	41
Wit and Whistle	42
Newsmakers	43

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

editorial

SPORTS ACTIVITIES IN I. C. F.

The I. C. F. Sports Council, though still in its infancy, has been making quite a name for itself. Sports activities have been receiving adequate attention and the I. C. F. colours have been carried with distinction in a number of tournaments. Two notable victories were added last month to the steadily growing and impressive number of victories already to its credit. Whilst the Hockey XI won the M. U. C. Gold Cup, the Football XI, considered to be one of the leading teams in the State, knocked off the much coveted M. F. A. Shield. This is the first occasion the Madras Football Association is conducting the tournament on the same lines as other all India tournaments held at Bombay and Calcutta and therefore our team's victory is all the more praiseworthy. It is heartening to note that the Cricket XI and the Badminton Team are also emulating the Football and Hockey teams in bringing glories to the I. C. F. Whilst offering our congratulations, we extend our good wishes to all the representatives of the I. C. F. Teams for continued success.

Monthly Outturn

	Target figures		Actual figures	
	K.D. coaches	Indigenous coaches	K.D. coaches	Indigenous coaches
July, 1958	...	...	5	20
			7	25
Cumulative total for the first 4 months of the year 1958-1959	...	...	20	70
			26	88

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

NEWS AND NOTES

Railway Board's Proposal to Award Shields for Good Work

The Railways have under consideration a proposal to introduce "Efficiency Shields" to be awarded periodically for the best performance on each Railway in the sphere of passenger and goods transportation.

According to this proposal, separate "Efficiency Shields" will be instituted on each Zonal Railway on an inter-divisional or inter-district basis, so that the division or district reporting the best performance in a specified period would be awarded the shield, which will rotate from period to period.

The Railway Board, in making this proposal to the General Managers, had said that criteria for the award of the shield could include items like efficiency of wagon and locomotive usage, economy in coal consumption, punctuality of mail and express trains, the record relating to accidents, etc. The Railways have been given the option to decide their own criteria.

The results, before making each award, would be judged by a committee of some of the senior-most officers on each Railway.

Railway Co-operative Societies

More than 56,500 Indian Railway employees are members of the Railway Consumer Co-operative Societies.

Membership during the second half of 1957 marked an increase of 11.5 per cent, compared to the first half of that year. On the Southern Railway, the number of members crossed the 10,000 mark, while on the Western and Central Railways, membership is just under this figure.

The number of consumer co-operative societies increased from 111 to 118 at the end of December, the Western Railway having the

largest number—25. The Central Railway followed with 21 societies, while Chittaranjan Locomotive Works and Integral Coach Factory have one each.

The Railway Board has asked the various railway administrations in the country to take vigorous action to popularise the co-operative societies among their employees.

Option for Railway Pension Scheme

Following representations made to it, the Railway Board has decided that the last date for railway staff to exercise option in regard to the pension scheme is to be extended from June 30 to December 31 this year.

This is the second time an extension has been granted and the Railway Board has decided that no further extension of the last date should be allowed.

The present extension will not apply in the case of those who have retired on or before June 30, 1958. This is being done in order to ensure that the settlement of the claims of those who have retired are not unduly held up.

As regards those who have already made their final option, the Railway Board feels that the question of giving them another opportunity to exercise a fresh option is not justified. However, a re-option would be allowed in cases where employees can advance strong grounds explaining that they had exercised the original option through a misapprehension.

Those who fail to exercise their option by December 31, 1958, or those whose option is incomplete, conditional or ambiguous in any way will be deemed to have retained their existing retirement terms under the State Railway Provident Fund Rules.

Scope for Small Scale Industries Meeting Railway Needs

Addressing the District Industries Officers from various States undergoing training at the Small Industries Service Institute in Nungambakkam on July 22, Mr. P. N. Talati, Controller of Stores, Southern Railway, explained the possible impact of the railway development programme, on small-scale industries. He said that the Railways were most anxious to help the expansion of the existing capacity of Small Industries for the maintenance of the several items required by the Railways.

Mr. Talati said that the Railways were fully conscious of the need to conserve foreign exchange and were exercising close vigilance to ensure that the available indigenous materials were utilised to the fullest extent. The Railways he said, had been asked to plan for an additional carrying capacity of about 61 million tons by the end of the Second Plan, which represented an increase of roughly 58 per cent over what they carried at the end of the First Plan period. To discharge this task effectively they had to undertake large-scale development of their resources and equipment.

Mr. Talati told the industries officials that as they were concerned with small-scale industries, it might be of interest to them to know that for the works programme of the Southern Railway during 1958-59, the permanent way fittings that would be required were of the order of about 11,000 tons valued at Rs. 73 lakhs. "We shall welcome any steps taken by you to develop the existing capacity for these items in the country," he said and added that ten times this quantity would be required by all the Railways in the country for their works programme already sanctioned.

Mr. Talati listed some of the items required by the Southern Railway, which were capable of being manufactured by the small industries and said that the Railways were anxious

to assist the Small Industries Service Institute in its efforts to expand the existing capacity for manufacture of hundreds of items required by the Railways. He also said that the Railways had a large stock of condemned rails which could be converted into various useful items and the Institute could explore these avenues of expanding the capacity of the small-scale industries.

Foreign Exchange Requirements for Development of Railways

The foreign exchange requirements of the Indian railways are expected to "figure prominently" in the discussions now going on in Washington between Indian representatives and U.S. Officials.

The foreign exchange component of the railway plan is of a fairly large size. Out of Rs. 1,125 crores allocated for the railway's plan, the foreign exchange component comes to Rs. 425 crores.

Mr. Y. T. Shah, Joint Director, Finance, Railway Board left for Washington on July 13 to be available to Mr. B. K. Nehru in his discussions with the United States Government for foreign exchange assistance to India. Mr. Shah was one of the five-man Railway Board delegation which successfully negotiated a 90-million dollar loan with the World Bank in Washington last autumn.

Rail Concessions from July 15

As in previous years, concessional return tickets at $1\frac{1}{2}$ single journey fares will be issued on all the railways, from July 15 to September 15, 1958, for Class I, II and III. These return tickets will be issued only between stations which are situated over a distance of 300 miles from each other.

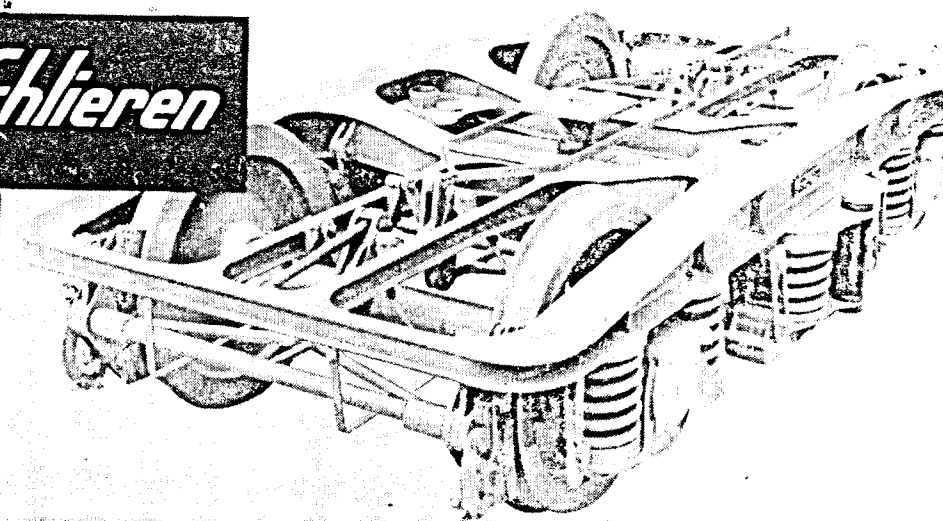
Break of journey on the return journey will not be permissible, but it will be allowed on the outward journey, according to the normal rules applicable in case of single journey tickets.

Passengers are required to present the return halves of their tickets at the booking office of the station from which the return journey is to start and have them dated, indicating the date of commencement of the return journey. This is compulsory, as passengers holding return halves which are not so dated will be treated as ticketless travellers.

The period of availability of the return tickets will be 20 days for journeys between 301 and 500 miles, 25 days for journeys between 501 and 750 miles, and 30 days for journeys of 751 miles and over. The return tickets, however, will not be valid for completion of the

return journey after the midnight of September 30, 1958. For example, a return ticket issued for a distance of over 750 miles on September 15 will be available for completion of the return journey only up to September 30, 1958.

Separate series of 'Mail' and 'Ordinary' return tickets will be issued in case of II and III classes at the appropriate fares available by 'Mail' and 'Express' and 'Ordinary' trains respectively. Similarly, combined Mail Express and Ordinary tickets will be issued where necessary.



**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)

INCREASE YOUR PROFITS BY WORK STUDY

(Reproduced by special permission of ORGANIZATION, PLANNING AND EFFICIENCY, January-March 1958. Copyright by Scientific Management (India) Private Ltd., Bombay).

THERE ARE TWO WAYS OF INCREASING PROFITS OF AN INDUSTRIAL UNDERTAKING : EITHER BY CAREFUL AND SYSTEMATIC ELIMINATION OF ALL WASTAGE IN HUMAN EFFORTS, MACHINE, MATERIALS AND TIME—OR BY INSTALLING THE MOST MODERN MACHINERY. THE STREAMLINING OF A PRODUCTION PRICES CAN BE CARRIED OUT WITH INSIGNIFICANT COSTS, RECOVERABLE IN A FEW MONTHS' TIME BY THE SAVINGS ACHIEVED—A PURCHASE OF NEW MACHINES REQUIRES, HOWEVER, HEAVY CAPITAL EXPENDITURE, THE DEPRECIATION OF WHICH IS SPREAD OVER MANY YEARS. IIII

Every Managing Director and every Works Manager must be vitally interested in improving the production methods and in eliminating every conceivable form of wastage in his plant. The task is not easy : it requires a systematic analysis of the existing production methods and, if found wasteful, substituting them by new ones, more economical in effort and materials.

The whole production process must be organised as an open effortless and well balanced flow of the chain of operations, starting with the handling of raw materials and finishing with the storage or despatch of products.

Each single operation may be compared to a spare part in a machinery : it must be well designed and constructed to be able to " feed " the next one. How much effort is usually needed to design a suitable spare part—and how LITTLE effort is exerted to study and analyse the operations to find out whether they could be performed with LESS effort and less fatigue !

IT IS A WELL-KNOWN FACT THAT THERE IS NO WASTE OF ANY KIND IN THE WORLD THAT EQUALS THE WASTE FROM NEEDLESS, ILL-DIRECTED AND INEFFICIENT MOTIONS, AND THE RESULTING UNNECESSARY FATIGUE.

The principal ideas of time and motion economy are as follows : each operation is carefully analyzed and dissected into its basic motions or elements, which are measured by stop watches and the times noted on Time Study Sheets. The average figures for every basic motion is then carefully compiled out of 15-30 data. After deducting allowances for fatigue, relaxation, personal needs etc., the final figure represents the Standard Time for the basic motion in question. If the operation under consideration was divided into say 7 basic motions then the Standard Time for the whole operation is the total of 7 basic motion times.

The Standard Time is the Standard of Measurement of labour costs and a scientific basis for the price calculations of the final products. The Time and Motion Economy is usually linked up with incentive schemes, the advantages of which must be clearly evident to the workers as otherwise a great deal of friction can hardly be avoided.

Works Measurement provides management with valuable information which can be used for the following purposes :

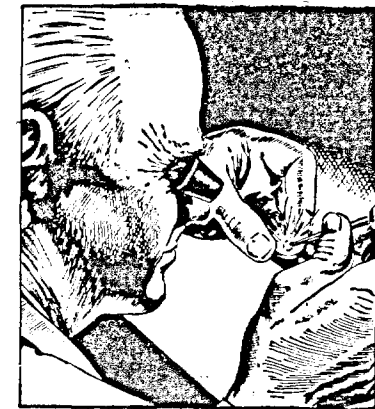
- (1) To help in finding the best layout ;
- (2) To determine accurate manufacturing time which will serve as a basis for estimates, quotations and delivery dates ;

- (3) To plan the programme of work and the number of workers and machines to carry it through ;
- (4) To disclose the reasons for hold-ups and lost time ;
- (5) To obtain a firm and fair basis for bonus incentive schemes ;
- (6) To find the true cost of work done.

A good FACTORY LAYOUT ensures continuous flow of production without bottlenecks or minor disturbances. A bad layout causes jerky production flow, uneven distribution of work, unnecessary costs in material handling and many additional expenses.

To sum up, systematic Time and Motion Study and Work Measurement form a basis for further improvements in every modern plant. Expenditure connected with these investigations is insignificant and can be recovered from the effected savings in a few months' time.

DID YOU KNOW?



A U.S. firm now mass-produces industrial diamonds synthetically which experts call as good as natural ones. The process used creates in a few minutes what it takes nature millions of years to accomplish.

MODAK RUBBER PRODUCTS PRIVATE LIMITED

GOLANJEE HILL ROAD

SEWREE

BOMBAY 15

(On the Approved list of D. G. S. & D. New Delhi)

Supply all requirements in

**MOULDED AND EXTRUDED RUBBER PARTS
UNDER
HIGH TECHNICAL SUPERVISION
PROMPTNESS, EFFICIENCY AND HONESTY
OUR CODE WORDS**

Tel: 62139

Gram: 'MODRUB'

SUPERVISION IN INDUSTRY

(Reproduced by special permission of ORGANIZATION, PLANNING AND EFFICIENCY, January-March 1958. Copyright by Scientific Management (India) Private Ltd., Bombay).

SUPERVISION IS ABSOLUTELY NECESSARY FOR THE EFFICIENT PRODUCTION OF COMMODITIES AND SERVICES. IF WORKERS ARE NOT PROPERLY INSTRUCTED, GUIDED AND ASSISTED THE FACTORY CAN HARDLY PROSPER, SINCE THE GOODS CANNOT BE ECONOMICALLY PRODUCED AS TO BE WITHIN THE BUYING RANGE OF PEOPLE FOR WHOM THEY ARE DESIGNED.

The supervisor is the link between the management and the workers. The management entrust him with the execution of its plans and the worker expects guidance, instruction and assistance.

His job is very difficult and highly responsible; he occupies one of the key positions in industrial production. Efficient, competent and tactful supervisors with initiative and vision are real pillars in every factory. No money should be saved on their training and education.

Lack of efficient supervision is bound to be felt in three directions:

- (a) management will be unable to carry out the planned production programme in volume, quality and time,
- (b) workers will become increasingly dissatisfied and restless, and
- (c) finally the finished goods will turn out to be too expensive on account of inefficient production, caused by lack of competent supervision.

What are the qualifications of an efficient supervisor?

1. In the first place he must have the intelligence and technical skill to perform the jobs assigned to the workers under his supervision.
2. Further he must be able to instruct and assist his men in their daily work with a view to continuous improvement.
3. He must gain and retain the confidence of both management and workers. Only honest, competent, loyal and industrious supervisors with sound judgment can achieve it. There are, however, several degrees in perfection.
4. His psychological insight, practical organizing ability will help him to select the right man for each job, and to handle complicated situations with justice, skill and tolerance.
5. Work assigned to him must be properly planned and efficiently executed.
6. He should be trained in job analysis time and motion economy.
7. He must be loyal to the factory and to his men.
8. His department must be disciplined and clean.

The supervisors' responsibilities must be clearly defined and he must not be left in doubt as to any specific duties or obligations. An honest supervisor should feel the necessity for constant self-improvement. The abilities necessary for good supervision can be developed only through constant training.

MARCH OF SCIENCE

IGY Study of Glaciers unearthing valuable Data

In many parts of the world, ice is something to preserve food, but to scientists who are making a study of glaciers during the International Geo-Physical Year, the great masses of land ice have history written in them. From glaciers ranging from the equator to both poles, IGY glaciologists are extracting new data that may influence human progress.

This was made known recently in an interim report on the activities of United States Scientists by Hugh Odishaw, Executive Director of the United States National Committee for the IGY. Glaciologists from America are working with those of 27 other countries to make observations in the glacial area of the world.

In his report, Odishaw told how scientists and engineers of the U.S. Army's Snow, Ice and Permafrost Research Establishment have perfected techniques for drilling deep holes in polar glacial ice, to obtain a "core" of it, much as an oil well is drilled. The first hole was drilled in Greenland in 1956 and another boring was completed recently to a depth of 1,438 feet. The scientists feel that the cores are of great value for they hold a record of climate and precipitation over the past many hundreds of years.

The surface ice is examined by taking samples and making measurements of its temperature and heat conductivity. Deeper ice is explored by setting off explosions and by listening to echoes reflected by the bottom ice and by deeper layers of the earth's crust. The materials through which the shock wave passes affects the time the echo takes to return and thus allows calculation of the depth of the ice. By such calculations, it was found that Byrd

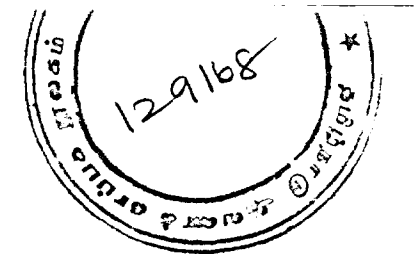
Station, at an elevation of about 5,090 feet above sea-level, stands upon ice almost 10,000 feet thick.

It is hoped that further exploration will show whether this is a frozen fjord or inland sea and what part of this submergence may be caused by the weight of the ice bending inward the earth's crust.

U.S. scientists at two locations in the Arctic basin are now making studies of the melting of the ice pack, the freezing of new ice, and the relations between the state of the ice and the local climate, the report states. Scientists on an ice floe about 300 miles from the North Pole have noted that during the past summer season about 12 inches of ice on the upper surface has melted, while as much as 18 to 24 inches of new ice has been frozen on to the bottom of the floes. Their layers are studied and give time information much like annual tree rings.

Ash from a volcano known to have erupted in Alaska in 1912 has been identified in one layer. The Odishaw report says that dust from the great explosion in 1883 of the volcano Krakatao in the East Indies will be a help in checking the dating of the annual layers in the cores. Because precipitation is lower in the Antarctic than in Greenland, Odishaw says that the ash layer is expected to be found at a depth of 60 feet in the Antarctic core and about 150 feet in the Greenland core.

Scientists of the nations co-operating on the glacial study have all of the known glacier areas of the world under observation including those at Mount Kilimanjaro and Mount Kenya in East Africa. Both glaciers are on the equator.



The great ice sheet of the Antarctic, over 6 million square miles of it, cannot be studied except in spotty fashion. Odishaw says, but teams of glaciologists, seismologists and their helpers are travelling by tractors and special oversnow vehicles thousands of miles across the ice in a series of traverses to make a profile of ice thicknesses and the earth that lies beneath.

"This observation will be placed in proper perspective," Odishaw writes, "when all the information or radiation from the sun, ocean currents, and temperatures of the air, ice, and oceans have been studied."

* * * *

Smokeless Safety Flare

An oil refinery safety flare that burns with no smoke and no visible flame has been designed by the Esso Research and Engineering Company in the United States.

Refinery flares burn off gases that might otherwise cause a safety problem. The gases are released to burn harmlessly when an operating interruption occurs.

While present refinery flares serve their safety function well, an Esso Research Engineer reported, the smoke they produce represents "a factor, even though small, in air pollution." The new flare, said to eliminate smoke entirely, is part of the company's continuing campaign against air pollution.

A second advantage of the new flare is that the gas is burned in the base of a 38-foot stack, rather than out in the open as in conventional flares. This was done because visible flame is often misinterpreted by passerby and nearby residents to be the result of a dangerous or wasteful operation.

New Technique Enables Aircraft to Fly Longer

U.S. Air Force flying equipment may soon be able to be airborne for longer periods of time thanks to a new technique based on a recent U.S. Air Research and Development Command scientific application. Using a high temperature

vapour for frictionless bearing lubrication, the new agent allows ball and roller bearings to operate up to 1,000 degrees Fahrenheit without the use of oils or greases as lubricants.

Hydrocarbon-air vapour composed of film-forming agents prevents abrasive metal oxides from forming on the bearings by continuously "filming" their rubbing surfaces. The film combats welding and seizure of the bearings as they slide against the moving surface.

Developed by Shell Oil Company Engineers working with scientists from the U.S. Air Force, the technique calls for the use of jet fuel for the hydrocarbon portion of the "atmosphere."

DID YOU KNOW ?



Two hundred years ago in the Tyrolean Alps (Innsbruck), artists developed the technique of painting pictures on cobwebs. Today the art is lost and experts say it is hard to believe that such fragile "canvases" could ever have been used, but over 100 cobweb paintings exist to prove it.

WHAT IS PRESTRESSED CONCRETE?

BY

D. RAMAN—COMPUTER

Introduction

One comes across the word "PRESTRESSED CONCRETE" sometime or the other and wonders why it is so much in the forefront in the present day topics and how it differs from ordinary Reinforced Concrete. Everyone might have come across prestressing in some form or other in our day-to-day life consciously or unconsciously. The commonest being in the form of fitting iron tyres to wooden cart wheels.

What is Prestressing

As the very name suggests it is subjecting an item to stress in advance of its use. That is to say, by external application of forces on a body, stresses are induced which are subsequently neutralised by stresses induced in it when it is put to its predetermined use. Naturally, prestressing, as it is called, has to be of a kind opposite to that which would normally be induced while in use. To make this more clear, let us view the example of iron tyres for cart wheels cited above.

The method adopted is to make the circumferential length of the tyre a little shorter than what is actually required, and heat it so that it expands sufficiently to be driven home on the wooden frame. It may be asked as to how this constitutes 'Prestressing'?

The fact is, when the tyre is driven home and it cools down subsequently, it is restrained from regaining its original length, thereby it is under a state of tensile stress. But when the cart is loaded and rolls on the road, the tyres are subjected to a compressive stress, the intensity of which may be much more than what it can safely bear but for the presence of tensile prestress, which has a neutralising effect.

Prestressed Concrete

So the idea of prestressing can be said to date back to centuries before reinforced concrete construction was evolved. The principle was mostly used in the construction of steel bridges of large spans. Soon after the introduction of reinforced concrete, the possibility of economy by prestressing was visualised but due to various factors, the actual application was delayed.

The chief impediment was the non-availability of high tensile steel without which prestressing could not be effected. Later on the advancement in making quality concrete and production of high tensile steel brought the idea back within the realm of possibility.

Why Reinforcement in Concrete

The use of reinforcements in concrete is by far a common knowledge, but its functional requirement may not be obvious. Everybody knows that when a bar of material is placed over two supports, some distance apart, and a load is placed over it, in between the supports the bar bends, this is indicated in Figs. 1 and 2.

Fig. 2 clearly indicates the effect of bending on the bar. The bottom layers elongate and the top layers contract to conform to its new shape. The bar, or 'Beam' as it is called, is then said to be subjected to a 'Bending Moment.' The bottom layers which elongate and the top layers which contract are under tensile and compressive stress respectively. In between these two layers, there must exist a layer which is not stressed and the plane of this layer is called the neutral plane. Also the intensity of stress varies from the neutral plane to the extreme layers, on both sides,

FIG.1

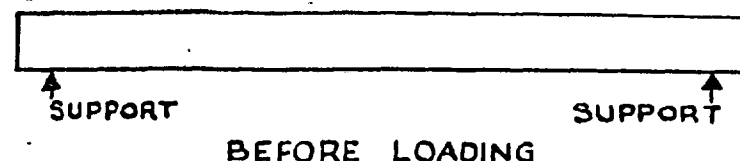
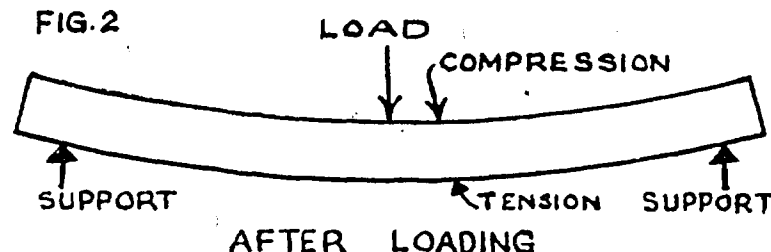


FIG.2



linearly reaching its maximum value at the farthest layer.

Concrete which is strong in compression has little or meagre tensile strength. Consequently, if it is to be used as a beam, it will fail under load due to lack of strength in tension. Reinforcement is provided to take up this tension. Steel is primarily used as its thermal expansion is identical to that of concrete.

A similar result is achieved in case of prestressed concrete, though the form is different. In this case, by introducing compression in the tension zone, the effect of tensile stresses under load is neutralised. This is achieved in the following manner :

High tensile steel is placed in the concrete and is stretched by external forces. It is then anchored in that state against the faces at the ends. With the release of force, the reinforcement tries to gain its original length but the anchors prevent it from doing so. Consequently concrete is placed under compression and said to be 'PRESTRESSED.'

Pre-Tensioning and Post-Tensioning

In prestressed concrete, the above principle is universally applied. This can be performed in two distinct ways. Firstly, the prestressing is applied at the time of casting i.e., the wires

are stretched, concrete is poured in and the release of forces applied externally in stretching the wires, takes place after the concrete has set and hardened. In the second case, ducts are left at the time of casting and subsequently cables are run through, stressed and anchored. Both the methods are common and used extensively. Each one has its own advantages and disadvantages over the other. The former of the two is called 'PRE-TENSIONING' and the latter is known as 'POST-TENSIONING.'

Prestressed vs Reinforced Concrete

The advantages of 'Prestressed concrete' over 'Reinforced Concrete' are not quite so obvious. But the economy consequent to prestressing is manifold and may be summed up as follows :

In the case of ordinary reinforced concrete, the reinforcements are effective and take up their full stresses only after the concrete has given way in the vicinity, whereas in the case of Prestressed Concrete, the ultimate tensile stress in concrete under full load is kept within the limits. Therefore the cracking so common in reinforced concrete construction is completely absent in case of prestressed concrete. As such it can be used with greater advantage where

prevention of corrosion in reinforcing steel is of prime importance.

Secondly, it can be proved mathematically that since the prestressing takes place under its own load, the dead load of the member is of no consequence. Hence for large spans and heavy loadings, the corresponding increase in dead weight, as in case of ordinary reinforced concrete, is very much less. Here it may be compared very favourably with steel structures.

Furthermore, in the case of reinforced concrete, high strength concrete cannot be used to full advantage on account of increase in steel area and resulting overcrowding. Whereas in prestressed concrete high strength concrete is most desirable. The economy in material can very well be anticipated.

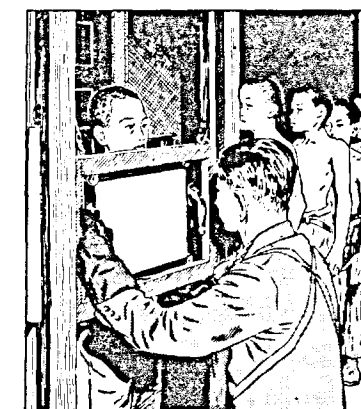
Summing up, it has been proved both theoretically and in practice, from time to time, that as compared to ordinary reinforced concrete, prestressed concrete requires only 40% of steel and 60% of cement.

Conclusion

From this the use of 'Prestressed Concrete' in solving our problems of concerning steel and cement, which are in short supply, can very well be appreciated. But in India, on account of non-availability of High Tensile Steel and patented forms of Prestressing equipment we are to depend largely on imports. Also the experience required for this kind of work is comparatively low. It is only because of these factors that 'PRESTRESSED CONCRETE' has not yet taken its right place in the constructional field of this country. But there is

no doubt of its gradually increased application in the near future when the developments in this country will also be able to compete with steel structures in both overall cost and speed of construction. The day may not be too far when we shall also have pre-fabricated, prestressed concrete replacing traditional steel in the construction of Workshops of great magnitude like Chittaranjan Locomotive Works and Integral Coach Factory, as in other advanced countries of the West.

DID YOU KNOW ?



The Republic of China has posted a remarkable health record for 1957. Of 91,289 deaths throughout Asia last year from small-pox, cholera, plague, fever and typhus, none occurred on Taiwan. There have been no fatalities from malaria on the island since 1950. The story behind these inspiring statistics is one of cooperation by the Free China Government with various organizations, notably the World Health Organization and the U.S. International Cooperation Administration.

THE IMPORTANCE OF GRINDING WHEELS IN MODERN INDUSTRY

BY

T. V. SREENIVASMURTHY

The importance of grinding wheels to industry is well-known. It is difficult to find a manufacturing plant which does not use grinding wheels. Grinding wheels play a vital part in giving new life to the wornout cutting edges of tools, which become blunt during metal cutting operations.

Although grinding wheels are used extensively in all the workshops it will be interesting to know that they were known to man ages ago. We find the term "Grind Stone" in the Holy Bible. Highly finished work of metal and stone, with the help of "grind stones" are found in the ancient pyramids of Egypt, which speaks of skill, experienced craftsmanship, and handling of "grind stones" so early by man. These stones were found near sea shores and in river sand. Old records show that these types of stones were in use to sharpen blades of steel in England in the 18th Century.

At the time of the "Industrial Revolution" in Europe natural grind stones were used in small factories. They were to be found in various parts of the country and so did not belong to one group or quality. Some were hard and brittle; and some were soft. Great care had to be taken in bringing these stones to the form of a wheel, and also in operating and maintaining them. This problem led the engineers to invent new grinding stones to satisfy all the requirements of the various grinding problems.

As we say "necessity is the mother of Invention," so the answer came, almost suddenly, in the year 1889 when Edward G. Acheson first produced Crystals of Silicon Carbide abrasive by an artificial process. Thus was

the "Dawn of Artificial Abrasive Age." In summer 1891 the Carborundum Company of New York undertook the manufacture of 60,000 wheels to meet the heavy demand of abrasive wheels by American industries. In 1900 the production of Aluminium Oxide Crystals from Bauxite Ore was invented. Today grinding wheels made of Aluminium Oxide are used extensively when compared to Silicon Carbide wheels.

The production of Synthetic abrasives made possible the manufacture of every kind and form of wheel, with high grinding efficiency, not found in natural grind stones. The handling of these wheels also became easy. With the help of these grinding wheels it has been possible to obtain accurate surfaces to close tolerances.

The grinding wheel can be compared to a milling cutter, with an infinitely large number of small irregularly shaped cutting edges. These cutting edges will scratch the metal removing small chips in the form of particles during grinding operation. It can be clearly seen that these minute cutting crystals are held in position with the help of a bond material when viewed under a magnifying glass. The bond which holds these crystals in position acts like a tool post.

The abrasive materials are of two kinds, i.e., Natural and Synthetic. Diamond, Sand Stone, Corundum, belong to natural group. Aluminium Oxide (Al_2O_3) and Silicon carbide (Sic) and synthetic diamond belong to the synthetic group. Synthetic diamonds are used in the manufacture of diamond impregnated

wheels for lapping Tungsten Carbide tipped tools.

It is said that the first man-made synthetic diamonds were produced on 15th February 1953 by Baitsar Von Platch, a Swedish Scientist, and that the process was kept a secret for two years. Thanks to the General Electrical Company of America which produced synthetic diamonds on a large scale, from Carbonaceous material. The public got the benefit of the discovery. The diamonds are produced under pressures, 100,000 times greater than the atmospheric or for 1,600,000 pounds per square inch and under high temperature of over $5,000^\circ F$. maintained for long hours.

In the manufacture of Aluminium Oxide Crystals, the raw material is "Bauxite Ore." The Ore was known to be non-fuseable until the invention of direct arc electric furnace. The Bauxite Ore after mining is crushed in crushers. The crushed bauxite is put through rotating kilns for calcination and removing pit dampness. The smelting process is carried out in direct-arc resistant type electric furnaces of 500-2,000 KVA capacity. The furnace has a floor area of carbon bricks on which the furnace casing is placed. During the smelting process the casing is water cooled from outside. After charging the furnace with calcinized bauxite ore, the electrodes are introduced into the furnace from top and current is automatically controlled during smelting. The ore melts at about $3,000^\circ C$ and becomes a big mass. Then the supply is switched off, and the cooling of the melted mass is carefully controlled to get sharp edged crystals. This process of crystallization takes about 8-10 days. When the mass completely cools down, it is broken into small lumps. These lumps pass through magnetic separators, and later are cleaned by acids and alkalies to remove impurities. After this they are crushed further and screened according to grit specifications.

Besides electrically fused alumina, Silicon Carbide is also produced in electric furnace

of resistant type. The crystals are produced by smelting silica sand with coke, saw dust and salt. The whole mass melts at $2,000^\circ C$ and is allowed to remain in the same temperature for 30 hrs. Afterwards the mass is allowed to crystallize. These crystals are sharp edged, hard, brittle, and break down readily presenting sharp edges to the work. This characteristic enables their being used for grinding materials of low tensile strength and non-ferrous materials. In this group, green grit silicon carbide wheels are used for rough grinding of Tungsten Carbide tipped tools.

As already explained the purpose of bond is to hold the abrasive grains together in the form of the wheel. The bonding materials can be divided under two main groups:

(1) Inorganic

(2) Organic (Elastic)

The Inorganic variety consists of ceramic clay, china clay, feldspar and sodium silicate.

The organic variety comprises of natural resin, rubber, shellac, Synthetic resin, bakelite and plastics also fall under the same category.

The performance of abrasive articles in the grinding wheel depends much on correct bedding of the abrasive grain by means of bond. The physical and chemical properties of bonding materials have been the subject of intense study from the early days.

In the inorganic bond, vitrified wheels are used in workshops for almost all grinding purposes. Silicate bonded wheels are used wherever cool cutting, surface grinding, and fine finishing are required.

The Synthetic bonded wheels are always run at higher circumferential speeds than other bonded wheels. Rubber bonded wheels are used where good finish is required, and also for cutting off purposes of all kinds of steels. Because of the flexibility of the bond, there is less chance of breaking, and the wheels have good strength and toughness even though they

be as thin as .005" Shellac bonded wheels are used in the same way as rubber bonded wheels but it cuts more freely without burring the work and more suitable for deep cuts. Plastic bonded wheels are used in the field of diamond wheels for lapping of Tungsten Carbide Tipped tools.

Manufacture of grinding wheels

The majority of grinding wheels are made by the vitrified process. This method consists essentially of mixing the abrasive grains with the correct amount of clay with predetermined characteristics of bond, in a mechanical mixer with adequate quantity of water. After thoroughly mixing, the mass, resembles moulding sand, is sent to the moulding department. There are two types of moulding :—

- (1) Density moulding.
- (2) Pressure moulding.

Nowadays pressure moulding is adopted by almost all abrasive wheel manufacturers.

In pressure moulding the mass is weighed first and then put into iron moulds of different shapes and sizes. These moulds are always 'over' in size in all dimensions to have sufficient material for removing at the time of the finishing process. The pressure required depends on the hardness and structure required and it is applied hydraulically. The pressed blanks, as they are called, dry easily as there is little moisture to evaporate. These blanks, piled on racks mounted on trolleys, are dried in the drying room. After drying the blanks are pushed into the tunnel of burning kilns. As the trolley enters the tunnel of the kiln, the blanks will become further dry in the preheating zone. As it travels further into the heart of the tunnel it enters into the highest temperature zone of 1,200°C to 1,400°C, at which the bond melts and holds the grains of abrasives in position. As the trolley moves forward the temperature drops down gradually and the melted bond solidifies. The wheel is then sufficiently hard to be handled. When

the trolley comes out of tunnel at the other end the wheels will be still warm and so are allowed to cool.

The advantages of this process is that the wheels manufactured are extremely strong and can be made to varieties of grits and grade. This method gives the wheel the desired porosity and density to the finished product as may be required for any particular grinding operation. The wheels are open in structure and so grind rapidly without heating the work. They are not affected by water, oil, acids, temperatures and climatic conditions. Moreover the bond is hard, and itself acts as an abrasive. The wet mixing of abrasive and bond gives uniformity to the mixture. High temperature during firing process in kilns burns away the impurities leaving only the abrasive and bonding material.

The disadvantages are :—(1) As this process slow large wheels are liable to crack when being fired in kiln. (2) and so the size of the wheel is restricted to 24" to 30" in diameter. (2) Burning process is difficult to control and some wheels may have to be scrapped. (3) Too much heating also results in weakened abrasive.

The other process used in the manufacture of abrasive wheels is called the silicate process. In this process Sodium Silicate is used as the bonding material. Wheels produced by this method have a mild cutting action suitable for grinding fine edged tools and knives of various kinds. This bond gives the wheel an extremely open structure, and is used for surface grinding where the area of contact between the wheel and the work is considerably more. During grinding process the silicate of soda in the bond acts as a lubricant. The wheels can be made upto 60" diameter. These wheels are not suitable for rough grinding. They are very good for sharpening of razor blades, surgical instruments etc.

The demand for grinding wheels is increasing rapidly, and so are the problems of their use.

Uptill now all grinding wheels were imported but to become self-sufficient in this field and to save foreign exchange, the Government of India granted licences to three firms to manufacture grinding wheels to meet the demands of Indian Industries. They are :—

- (1) Grindwell Abrasives Ltd., Bombay.
- (2) General Abrasive Ltd., Bombay.
- (3) Carborundum Universal Ltd., Madras.

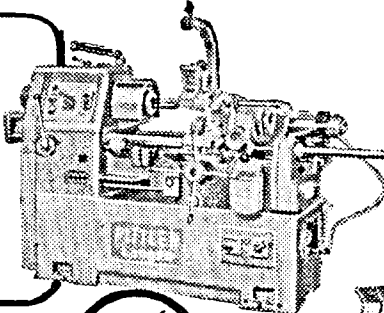
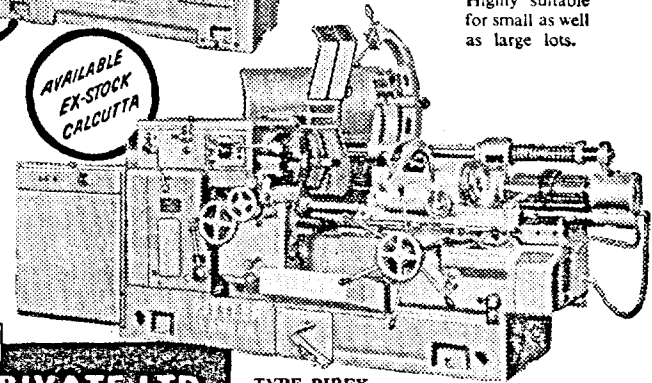
The above firms are supplying different kinds of grinding wheels to the Indian Industry. Raw materials like grains and bonds are imported at present, but the manufacture is done in India. There is the likelihood of starting a manufacturing plant in India for Abrasive grains, since "Bauxite Ore," from which Aluminium Oxide Crystals are made, is available in plenty.

We hope to see the "Dawn of Synthetic Abrasive Age" in the Indian Industrial History very soon.

REDUCE YOUR COSTS
by using
PITTLER
DRUM TYPE TURRET
SEMI-AUTOMATICS

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 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.

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

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

Resident Engineer in South India:

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

THE INGREDIENTS OF PERSONAL EFFICIENCY

(Reproduced by special permission of ORGANIZATION, PLANNING AND EFFICIENCY, January-March 1958. Copyright by Scientific Management (India) Private Ltd., Bombay.)

TO BE SUCCESSFUL YOU MUST BE EFFICIENT IN YOUR PROFESSION. EFFICIENCY IS A MENTAL ATTITUDE, WHICH HAS TO BE CULTIVATED. HOW IS THE OBJECT THIS PERMANENT SECTION

Learning by Effort

If you wish to become a good cricketer, tennis, football or hockey player you must train your muscles and your mind. The more thorough and scientific your training—the greater your success.

This simple formula applies, in principle, to your profession—whether you are an engineer, accountant, salesman or manager. There is, however, a difference: instead of training your muscles you must train your will which, in the last analysis, is the very source of the driving power that determines the shape of your existence and the range of your success or failure.

The exertion of effort is something which has to be learned. Effort in itself is not only educative in a progressive and cumulative sense, it helps to preserve and strengthen the power you already possess.

Only by some form of strenuous activity can our qualities be kept in a state of efficiency. Struggle is man's effort to realise himself and to fulfil his destiny. So, do not covet the easy life as if it were ideal. A grown-up man who accepts a subsidy from his parents usually relies upon it to his detriment. *The progress*

that has marked human history is due to the effort to succeed.

The Dynamism of Will

The efficient and thoroughly trained mind is the only universal asset in the world. Every profession is eager to employ it.

How does human mind manifest itself? In three forms: emotion, intellect and will.

Emotion or feeling, we know, is the most fundamental of our psychical functions. Feeling in the form of desire is always urging us forward to action and thought sits in judgment deciding for or against every scheme for which a plea is made.

Will never acts independently of feeling and intellect—it cannot for all the functions of the mind form a unity.

Weak Will—Strong Will

Many people ask: why is my will weak? There may be several reasons: (i) ill health or (ii) the feeling-power that drives our mental forces has been dissipated or (iii) we have not formed good will power habits, but bad ones. If your ideal is comfortable living without effort and exertion, you have formed a negative habit, a weak will, that does not force you to learn by effort, to overcome difficulties and to succeed.

If one falls into uncontrolled anger, thinking is reduced to a fraction and the will propels us to say or do something which we regret afterwards.

There are people highly educated, who seem to know everything, who think, study and read all the time—but never do anything. To make a decision—is a torture for them. Their intellect simply stifles the proper functions of feeling and will.

It appears that all the difficulties concerning weakness of Will arise out of wrong feeling or wrong thought. Will Power is essentially direction and control: both must be trained.

How to train self-discipline and will power

Strong will that should lead us to success is—in a nutshell—a group of powerfully ingrained habits of an active and constructive kind.

Our lives are governed by our habits, good, bad or indifferent. In theory, our problem is simple: to replace bad and indifferent habits by good ones, passivity by activity. The difficulty starts with the question: how? The pull of the old habits is tremendous and we realise it only when we have decided to change them. For a teetotaller prohibition means nothing—but for persons accustomed to their glass of beer for dinner, or a chotta peg after sunset—it means a lot. A strong smoker must develop intense effort if he has to stop smoking. He—or she—can do it in two ways (i) either by sheer will-power, inflexible resolution to stop smoking or by (ii) side-tracking the “smoking-habit” by another, i.e., taking confections instead.

Many persons are real artists in delaying and postponing any work they have to do. Others suffer from general irresolution, lack of perseverance or concentration.

The first step to cure our bad habits is to be well aware of them, to realise their poisoning influence on our career and detest them. Bad habits are maladies, as dangerous as tuberculosis, or other infectious diseases. They will ruin your career, even your existence.

Mobilise, therefore, your courage, common-sense and self-criticism and write down all your bad habits. Be strict and ruthless with yourself. Don't be too conceited to call yourself names if you deserve it—there are healing properties in these bitter pills. Then classify your bad habits from the point of view of their negative influence on your career.

So far—if you have been honest with yourself—you have got the right diagnosis.

The next step is the cure. To overcome any sort of undesirable habits is not to fight them, but to develop the opposite qualities. If you habitually postpone any unpleasant work—start every morning with a list of disagreeable tasks—and carry them out. In a few weeks time your “bad habits” of postponing will be replaced by a “good habit” of carrying out unpleasant work first thing in the morning. Then, your mind and body will be freed from the poisonous burden of unfinished and accumulated tasks you detested. You will feel many tons lighter, ready for new creative work.

It is relatively easy to devise cures for our bad habits and to form resolutions, the difficulty, however, lies in carrying them out.

FIRST, WE MUST REALISE THAT DEVELOPING WILL-POWER IS A PROGRESSIVE EDUCATION, NOT A SUDDEN MIRACLE AND THAT OCCASIONAL FAILURES MUST NOT DEPRESS US UNDULY . . . WHAT REALLY MATTERS IS PERSEVERANCE, BECAUSE EVERY THOUGHT CHARGED WITH FEELING TENDS TO BECOME AN ACTION—AND REPEATED ACTIONS TRANSMUTE THEMSELVES INTO HABIT. THIS IS THE LAW. THEREFORE: THINK SUCCESS, PLAN SUCCESS, BELIEVE IT, DREAM SUCCESS, WORK FOR IT—AND SUCCESS WILL BEGIN TO COME YOUR WAY.

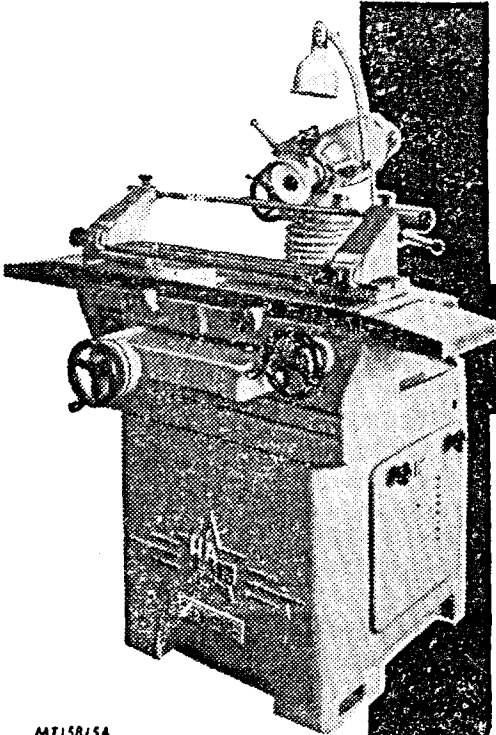
Efficiency and Prosperity

IF A WAVE OF EFFICIENCY-STUDY SWEEPED OVER INDIA, IT WOULD DO MORE THAN ANY ONE THING TO INCREASE PROSPERITY AND HAPPINESS.

EFFICIENCY DOES MORE TO PUT VALUE INTO SHARES THAN LABOUR OR MACHINERY. THIS IS A FACT NOT GENERALLY UNDERSTOOD.

THE SECRET OF BUSINESS SUCCESS—OF CREATING PROSPERITY—IS MORE AND MORE EFFICIENCY.

THE TWO THINGS THAT A BUSINESS MAN NEEDS MOST, WE MIGHT SAY, ARE FACTS AND WILL-POWER. IF HE HAS FACTS WITHOUT WILL-POWER, HE WILL NOT GO FAR; AND IF HE HAS WILL-POWER WITHOUT FACTS, HE WILL GO IN WRONG DIRECTION.



HABIB

**UNIVERSAL
TOOL & CUTTER
GRINDER**

MADE IN SWITZERLAND

MACHINE TOOLS (INDIA) PRIVATE LTD.

CALCUTTA	BOMBAY	BANGALORE
BOX 585	BOX 522	BOX 697

MT158/54

NEWS FROM SWITZERLAND

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

The annual report of the Swiss Federal Railways

The Administration Board of the Swiss Federal Railways has just published its Annual Report for 1957. According to the information contained therein, the value of transports carried out by the S.F.R. in 1957 was the greatest to be recorded, up to the present. Thus, the Federal Railways carried, in 1957, more than 219 millions of passengers and 26 million tons of goods. The total receipts for transport amounted to 860 million Swiss francs (U.S.A. £200 millions), of which total 40 per cent was in respect of passengers and 60 per cent in that of goods.

Swiss watchmaking novelty

One of the most recent novelties to be found in the Swiss watchmaking industry is a wristlet—watch, provided with an indirect electric lighting system. This solves the problem of seeing what time it is in the dark, much better than the radium figures on the dial. A uniform lighting up of the dial, by means of a tiny bulb cleverly dissimulated in order to avoid any dazzle and which is connected with a miniature water-tight accumulator, is obtained by simply pressing on the push. The accumulator can be re-charged by means of a gadget, sold together with the watch, for a period of from six months to one year, according to how often it is made use of.

World's No 1 Clock in Neuchatel

The finest precision clock ever built was unveiled recently at Neuchatel Switzerland's traditional watchmakers' workshop. 'Lachesis' as it was baptised by its creators, is the first to measure time in accordance with the extremely constant oscillation of ammonia molecules. It even exceeds in exactitude the quart clock which had been the best so far. 'Lachesis' will be on exhibit in the Swiss Pavilion at the Brussels World Fair.

Pneumatic tube letter service

Already in 1912, the Swiss postal, telegraph and telephone service, had adopted a system of rapid conveyance within the premises of an office or between two buildings, namely the pneumatic tubes. At the present time, the internal lines in operation attain, in Switzerland, the length of 8,000 metres, whilst those used for external service exceed 20,000 metres. The transmission cartouches travel at a speed of from 7 to 8 metres per second in the internal lines and from 10 to 12 metres in the external service.

A new high-speed Swiss calculating machine

The PRECISA Ltd., in Zurich, a firm which enjoys a world-wide reputation, has just put the finishing touch to the prototype of a calculating machine that will carry out, *inter alia*, in a much shorter space of time than any similar machine existing today, the four classical operations. These will be printed on a paper tape, together with the automatic indication of the relevant stops and commas. This remarkable machine, which is made up of some 3,600 different parts, has come to crown the efforts of the founder of the firm, Mr. Ernst Jost, who has just celebrated his 70th birthday. It may be recalled that it was Mr. Jost who, in 1926, was the first to manufacture a calculating machine with only ten keys, one for each figure. It took him ten years to realise successfully a project which, at that time, appeared to be Utopian.

40,000 different types of files

Vallorbe, a small town in the Jura Vaudois, is not only an important frontier station on the line which, via Lausanne, connects the Simplon with Paris. It possesses another characteristic: that of being the home of a very special industry, namely the manufacture of

files. The production extends to nearly 40,000 different types, most of which are intended for manual work requiring great precision such as the finishing work on cutting-out tools, etc. The Metallurgical Works of Vallorbe also make saws and burs for metal drilling, and export 70 per cent of their production to fifty-five countries.

The Swiss Federal Railways introduce their ultra-modern rolling-stock

Trains composed of the most up-to-date carriages, with extremely comfortable seats similar to those used in civil aircraft equipped with a ventilating system, which heats (when necessary) and exchanges the air 6 times per hour, are now operating on the following runs : Geneva-Zurich, Zurich-Bienne, Bale-Zurich, Coire-Zurich, Bale-Geneva and Zurich-Bale.

Diverting rivers

Waters which have sped northwards from the Alps for thousands of years will in future make the journey in the opposite direction to the Adriatic. The consumption of electric current in Switzerland, as anywhere, has in recent years constantly increased. As a result the output of existing power stations had to be raised, or the construction of new ones contemplated. One limiting feature affecting the output of a hydro-electric power station is the quantity of the available water which is used to operate the turbines. How can one increase this quantity? Swiss engineers have solved the problem by tunnelling through the mountains, thus gaining access to new supplies of water. One of these tunnels is approximately 3 miles long and it took 2½ years to cut through the solid rock. The water from the Unteralp, one of the three contributors to the River Reuss forming at Andermatt, north of the St. Gotthard, is fed into Lake Ritom, south of the St. Gotthard. The yearly increase of power available to the Swiss Federal Railways will amount to 35 millions kilowatts.



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

SPORTS FOLIO

LAURELS FOR I.C.F. IN SPORTS & GAMES

BY

A. D. PARTHASARATHY (SPORTS COACH)

It is indeed a matter of pride for the I.C.F. to have secured so many laurels in the Sports and Field events within a short period of 3 years since the Sports Club came into existence. The phenomenal success is in no small measure due to the sustained interest evinced by the Administration and the I.C.F. Sports Council deserves to be congratulated for building up such formidable teams. With the patronage afforded by the Administration and the enthusiasm displayed by the members of the different teams there is every reason for hoping that the I.C.F. will occupy an honoured place in Railway Sports and Games.

The year that passed by was a particular significant one for the I.C.F. Foot-ball Team, as it won consecutive victories by annexing the Gymkhana Cup, Jatprole Cup, MFA Shield, in addition to the Second Division championship.

In the Gymkhana Cup Tournament, after beating formidable teams, the I.C.F. Team beat B. & C. Mills Team by 4 : 0. The team played foot-ball in copy book fashion and the high standard of game was greatly appreciated by the audience. Skipper Janakiraman in his new role as Goal-keeper and Messrs. Rajaram and Sreenivasulu came out with flying colours in the final match.

During the Jatprole Cup Tournament, Skipper Janakiraman was away at the All-India Foot-ball Federation trials and Stephen Shadrack, who deputised for him, led the team well and brought the cup defeating WIMCO in the Finals. The splendid performance of Shri Kanniappan of the RPF was the highlight of the Finals.

The Madras Football Association decided to conduct a tournament as other major tournaments conducted everywhere in the country and it is indeed a matter of great pleasure that the I.C.F. should have won on the first occasion. Teams from different parts of the country participated in the tournament and stiff opposition was encountered in practically every match. The finals with the M.E.G. was memorable in that the solitary goal for us was scored by a fine header by our Skipper Janakiraman.

The Skipper of the Football Team and all his team mates richly deserve our praise for all the victories they brought to the I.C.F.

The I.C.F. Hockey Team has been emulating the example of the Football Team and they achieved a notable double by winning the M.U.C. Gold Cup and becoming the joint holders in the M.H.A. League Tournament. Shri Bhaskaran, Skipper of the Hockey Team and all the other members have shown good form and excellent team work, but Sarvashri Jabbar and Syed Ahmed deserve special mention.

The I.C.F. Cricket Team had met with stiff opposition at the end of the season, but still shared the Second Division League Championship. Shri Sreedhar Alva deserves special mention for his allround performance in the tie match.

The I.C.F. Badminton Team, which was formed lately, won the D.V.R. Memorial Cup. The team has shown considerable promise and is bound to win many laurels in this field.

(Continued on page 32)

NUMBER PLEASE

BY

SMT. SOUMYA RAMASWAMY

The phone had not, as yet, been introduced in our home and we did not miss it much. But on rare occasions, when we had to ring up the doctor in a hurry or ring up for a taxi, or to find out at what time a train was due, we felt its absence acutely. It was most embarrassing, everytime to ask in a neighbour's house whether we could please use their phone. After one particularly exasperating day, when my husband, who wanted to meet a friend coming by the G.T.E. had to go and wait at the Central Station for more than 2 hours before the train deigned to make its arrival, he got really peeved. If we had a phone, all this could have been avoided, he thought. He could have rung up the Station and gone at the expected time of the train. Consequently, he asked at his Office for one the next day, and in due course, to be precise after five months a phone was installed in our house. We did not know then what was in store for us. The phone brought along with it a new set of problems, as we soon discovered.

It was firstly placed in a spot so conveniently reached up by our year and a half old toddler that it was a source of perpetual danger. Baby pretty soon discovered that it could be a delightful pastime for him if he pulled the phone to the very edge of the table where it was balanced, till it dangled precariously; and then sit back and watch gleefully while I rushed in to the rescue of the poor telephone and restored its equipoise, thus saving it from a hasty and premature death. This continued for two months till a wall bracket was fixed high up on the wall and the phone put on it, out of reach of the youngster. But in the meanwhile there were other problems.

The ratio of wrong calls to those intended for us was about 15 to 1 in the beginning. That was quite understandable for until very recently, the phone we were given was in a work-shop. So we used to get calls for everyone in the 'J' Shop or 'K' Shop or whatever it was—from the foreman and the Superintendent to Mr. X or Mr. Y, whoever they were. I imagined—how foolishly—that in 2 or 3 months, once everyone got to know the change of number in the J Shop, they would stop pestering us. But no. The wrong calls continued on and on—and continue still, even after a year. And the phone has an exasperating habit of ringing at all sorts of awkward moments. It rings stridently just when you have been trying to put Baby to sleep, and makes him get up with a bounce, with not the least trace of sleep in his eyes. It goes on ringing plaintively when you are in the bath. And it commands your attention with its shrill peal when the milk is about to boil over on the stove. And the anti-climax comes when you answer it and find it is only one more wrong number. And how persistent some of these wrong callers can be, I soon found out.

It was more than eight months since we had acquired the phone. I was busy in the kitchen that day when the phone woke up into action like an alarm clock. I thought I could answer it in a jiffy and be back. "Mr. Jacob of J Shop" the Voice at the other end enquired when I answered it. "Sorry, wrong number." I replied and was about to hang up when the Voice said "Is that not Mr. Jacob." "No" I replied again. "But the Directory says this is his number," the voice said, determined to get Mr. Jacob on the phone, once he had rung

up Mr. Jacob's number. "It may have been, but it is not now. This is the residence phone of Mr. R." I replied. "Then could you call Mr. Benjamin to the phone?" the Voice went on, ignoring my reply that the phone was located in a private residence. I explained laboriously to him that I was not speaking from the J Shop; that it was not a question of Mr. Jacob not being available, while Mr. Benjamin was; but that the phone was altogether in a different place—namely, in a private residence, and not in any Office. "What number are you speaking from?" asked the Voice. I gave my number. "But the Directory says it is Mr. Jacob's number," the Voice exclaimed, almost triumphantly. Poor fellow, I thought—he was taking the Directory's word for it as gospel truth, not being aware, perhaps, that it was probably three years since the Directory was published, and that there had been numerous changes in the telephone numbers since then. I politely suggested to him that even the Directory could be mistaken, and the number might have changed. "Then could you please tell me Mr. Jacob's number?" he asked. I disclaimed all knowledge of Mr. Jacob and his phone number, and hastily rang off, before being asked to submit reasons for not knowing Mr. Jacob's number. I went back to the kitchen, making a mental note to find out Mr. Jacob's number for fending off future calls—I could simply tell the callers to ring up such and such a number and ring off, without launching into what the Directory says or fails to say. When I reached the kitchen I could smell something powerful—not the nice aromatic smell which the curry I was preparing ought to have given out, but something akin to burnt leather. And when I looked into the pan, I could have bet it would have tasted like burnt leather too. All the water in it had long since evaporated, and if it was not the colour of coal, it came a brave second. And it had stuck on as fast as the best glue available in the market

can, to the bottom of the pan, and adamantly resisted all efforts on my part to evict it from the place it occupied. It was only when I summoned the help of water and soaked the pan and the curry in it for an hour and a half, that victory was mine. I succeeded in expelling the curry from the pan, and emptied it in a waste-bin a hundred yards off; but I could not expunge the kitchen of its smell, which hovered there for quite sometime.

Of course, you could avoid all such verbal duel, say briskly "Wrong Number" and hang up on such persons who persist that the number they have rung up is right because the Directory says so. But I have found out, from experience, that impatience with such callers does not pay. In another two and a quarter minutes, they would get all reorganized for the second attack, and would be ringing you up again; and it is only when you explain in detail what No. you are speaking from, and that it is a residence number and not an Office phone that they desist from ringing you up for the third time. Besides, with a Railway phone and only Railway people ringing up, you cannot be rude to anyone over the phone. There is always the chance that when you hang up abruptly on somebody it might be your husband's boss. I found this out too from personal experience. It was another call for that elusive Mr. Jacob, though a new voice speaking, I said "Wrong number" and was about to bang the receiver when the Voice quickly said, "Are not you Mrs. R.—speaking? I am Mr. N here....." It was one of my husband's colleague and a one-time neighbour of ours.

Besides the numerous wrong calls you get, there are also the persons who seem to ring up any number at random, as a sort of practical joke. I have received a few calls like this—whenever I answer them, there is only a long, brooding silence in reply. After shouting "Hello" "Hello" into the mouth-

piece half a dozen times, without eliciting even a single mono-syllable in reply, there is no recourse except to hang up.

At times, these calls become so irritating—my record was receiving 14 Mysterious calls in a single day—that I wish for the peace that reigned in our house before the introduction of that little black instrument called a telephone. But then, no—on second thoughts, it is a nice, convenient little thing to have around the houseparticularly when you want to ring up the Station and find out by how many hours the train you want to meet is late—it would save so much wear and tear on the station platforms if you and hundreds like you were not there two hours beforehand, pacing up and down. And it is so useful in other ways too.....as when you want to gossip with your best friend about the latest scandal. I would not want it removed now, for anything.....There goes the phone now, ringing shrilly. Three cheers for Alexander Graham Bell.

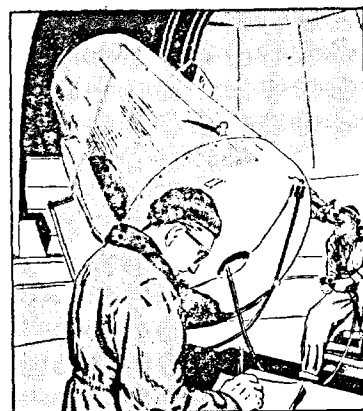
(Continued from page 29)

It has now been shown that the I.C.F. is not only capable of shattering production targets, but is also capable of showing great promise in other fields like Sports. I am sure by the grace of God, with the same zeal and enthusiasm shown by the staff and with the keen interest evinced by the Administration, the splendid performance hitherto shown will be kept up.

DID YOU KNOW?



Comets are no tenuous it has been estimated that 10,000 cubic miles of their tails contain less matter than a cubic inch of air. These tails, as in the case of the Great Comet of 1843, may be 200,000,000 miles in length.



A light-year, a term used in expressing stellar distances, is that distance travelled by light (speed 186, 239 miles per second) in one year and is 5,873,—185,800,000 miles. Most of the stars are more than 100 light-years away from the earth.

A HAPPY DAY AT THUMMURKONAM WATER FALLS

BY

M. HARRIS—SR. FOREMAN, SHOP 25

The long thought of picnic by the staff of Shop 25 under the scheme 'Human relationship among workers of I.C.F.' was so well planned and organised that the timings at the rendezvous as scheduled were maintained to the minute.

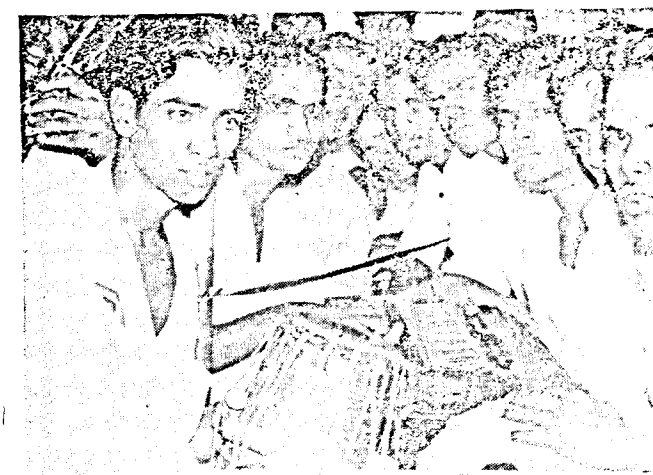
On Sunday, the 27th July, 1958, 100 of us started from Villivakkam at 7.30 in two buses profusely draped with paper streamers and carrying a cloth banner with the inscription "I.C.F. Paint Shop Picnic Party." Shri V. Narayanaswamy, Assistant Foreman and I were in charge of the two buses. In the party there were many young men who entertained the party with songs. The Rock-N-Roll tune in Hindi attracted the passersby throughout the journey. These young men kept us in a merry mood, which made us forget the tedious bus journey.

We had breakfast at Trivellore at 9.00 a.m. and resumed our journey at 9.30 a.m. Lunch was obtained at Trivellore itself and it was carried with the party.

After a happy ride of nearly 2 hours we reached the newly constructed Araniar Project Reservoir at 11.30 a.m. We strolled along the site to see the excellent small dam and after 15 minutes, started on our way to Thummurkonam. The road leading to Thummurkonam was not in good order and so the journey was not so good.

We had to push the bus over the sandy soil, but it was a welcome change after riding for 65 miles.

We reached the water falls at 12.30 p.m. and the boys became wild with joy on seeing the beautiful water falls. Though the boys



The Music Party.



The Party with the bus in the background.

were well dressed in a real happy-go-lucky way, the sight of the water falls could not be resisted and so they rushed off for a bath straightaway. It was really a pleasant sight to see the boys enjoying themselves so thoroughly.

The bath over, we sat for lunch at 1.00 p.m. under the shade of the big trees in a real picnic fashion. The much desired vegetable pulav and kurma was served to all and was followed by plantains and beeda. The party broke off at 1.30 p.m. for a stroll over the hills. Some went up the hill, some joined the music party while many were interested in the exciting game 'Dog race,' arranged by me.

This Dog racing was really a good attraction for the boys as they had to 'back' each dog at one anna a ticket and at the finish the tote was paid out for the first and second places. We had time for only a couple of races. The music party kept up with renewed vigour and none seemed tired of the trip.

It was time for the return trip and at 3.30 p.m. we left the place for Poondi. The Sathyamurthy Sagar was reached at 5.30 p.m. and we went round the Dam enjoying the well maintained parks.

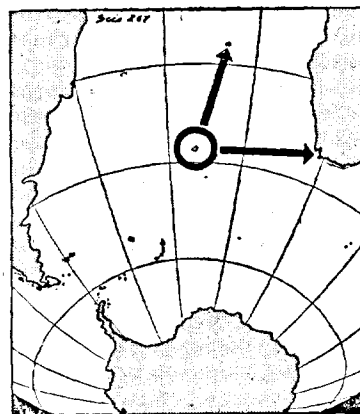
The evening tea was arranged at the Inspection bungalow at Poondi. We were really getting tired but after a wash and tea all of us felt greatly refreshed. After tea, I addressed the boys and expressed my appreciation and feeling of joy for being in their midst and participating in the unforgettable outing in which each one enjoyed himself so thoroughly. I conveyed my felicitations to Sarvashri V. Subbarayalu Naidu, T. V. Jadaraj, K. Jegannathan and N. Govindaswamy for their wholehearted efforts in organising this trip in such a grand manner.

The men not only enjoyed the trip and sight-seeing, but also the timely catering of relishing food arranged by the above members so well in advance and to time. Not only I, but anybody would have been immensely pleased by the way in which our Paint Shop workers proved their ability in making the trip a memorable one. The men were so much impressed that they even began to plan the next outing.

We left Poondi at 6.30 p.m. and arrived at Villivakkam at 8-15 p.m.

The success of the trip is entirely due to the participants moving like an organised family and totally forgetting their own status.

DID YOU KNOW?



The remotest island in the world is the island of Tristan da Cunha (population 294) in the South Atlantic, discovered by the Portuguese in 1516. It has an area of 12 square miles and was annexed by Great Britain in 1816. The nearest inhabited land is the island of St. Helena, 1,320 miles to the northeast. The nearest continent is Africa, 1,700 miles away.

VISITORS TO THE FACTORY:

Mr. Thomas W. Simons, American Consul-General, Madras and Mr. J. F. Barie of the United States Budget Bureau visited the factory on the 27th June, 1958. They were taken round the Workshops, the Furnishing Annexe and the Technical Training School. At the conclusion of the visit they observed that the Factory was a symbol of the "new spirit" of India and that this was one of the cleanest and best organised plants they had ever seen.

A delegation from the Chinese National Machinery Corporation led by Mr. Tsou Szu-yi, Deputy Director, Fourth Department, Ministry of Foreign Trade, China, visited the Factory on the 1st July, 1958. They evinced keen interest in the working of the Factory and, at the conclusion of the visit, the leader of the team spoke a few words stating that he wished India would produce more and more of this type of factories and be a model to other Asian Countries. Recording his impressions in the Visitors' Book of the factory he wrote:

"Here is the evidence that we Asian Countries can be industrialised and to be as advanced as any other country."

Shri Takhatmal Jain, Minister for Industries, Madhya Pradesh accompanied by Shri S. N. Mushran, Deputy Minister for Agriculture, Madhya Pradesh paid a visit to the factory on the 11th July 1958. He was received by Shri K. Swarup, Chief Administrative Officer and taken round the Technical Training School, the Furnishing Annexe of the Factory and the Workshops. At the conclusion of the visit the Hon'ble Minister was pleased to record in the Visitors' Book that he was "very much interested to know the progress done by the Factory" and "congratulated the management." The Deputy Minister also joined the Minister in congratulating the administration for doing such excellent work for the country.

On the same day Shri Mohd. Yunus, Charge-D'affairs-designate to Spain visited the Factory.

Shri M. Haque Choudhury, Minister for Food, Agriculture etc., Assam paid a visit to the Factory on the 25th July. He was taken round the Workshops, the Technical Training School and the site of the Furnishing Annexe. At the conclusion of his visit he observed that the factory was a wonderful achievement with vast possibilities for India in future.

TANGLED WEBS

BY

M. V. B. S. SARMA

The world that we inhabit suffers from dualities ! There is light and darkness, knowledge and ignorance, shine and rain, rich and poor, Democracy and Totalitarianism, theism and atheism, and lastly men and women.

We, the poor men folk, have always fought for the emancipation of women probably much more than women themselves. We agitated for their equal rights, equal opportunities, liberty, free love and what not. I would like to ask one question. Has any woman ever spoken about the oppression of the males ? Hark. I hear the rumblings of masculine groans. Before we try to talk about emancipation of women, we must set our own house in order. We must free ourselves first from our present 'Dominion Status' before we talk about full blooded Democracy for women. You cannot offer to others what you have not got, yourself.

In all ages women have held the reins, if not directly, wisely indirectly. They are born imperialists, schemers, colonialists, enslavers and strategists. They have reduced men into a totally domesticated animalization. I do not for one moment forget the contribution they have made to our happiness. Far from it. All that I essay to emphasize is that they have given us happiness with one hand and removed our freedom with the other.

I admit some women have moulded men ; they are artists. Some have egged on their lords to desired goals ; they are licensed drivers. Some have exploded with wrath before their lovers ; they come under (Red Tariff). Some have taken to swords and drove the marauders out ; they are scientists proving the femininity in the males. Some in

their irateness, have thrown buckets full of water on the heads of their philosopher husbands making them exclaim "It was thundering all along but now it rains," they are the fire fighting squad. So on and so forth. Like the ever-changing colour scheme of a chameleon, women change their colour even in other times than when they blush. The individual who wailed "Frauity! Thy name is woman" has made only a dismally decimal statement.

When I saw these atrocities, these humiliations piled over men, these subjugations and subjections, these quiddettings and quibbettings, these wiles and smiles, these charms and harms, these rogueries and chickeneries, these snares and sneers, these coquetties, these tantalizing looks and titillating glances, these undermining nylons, and captivating cosmetics, I decided I would remain a bachelor 'ad infinitum.'

I thought I should guard myself, erect an impregnable fortification and accumulate necessary ornaments against the unexpected onslaughts of Eves. I wanted data on the previous conquests. So I began to collect.

I collected Data no doubt but that was my ruin. It mellowed me and made me malleable. Every story I read whispered in my ears "My friend, you can't do without them. A woman is a necessity. To a man she is a biological necessity."

Let us take Arjuna for instance. An ordinary individual from a Hindu undivided family. To my knowledge he was not a Fulbright scholar. He did not even take a degree in Animal Husbandry. He never played Polo and never took even an occasional bet in Derby. His car had no fluid drive. He never

saw even once a super constellation in his lifetime. When offered a cigarette he could not distinguish 'Three Castles' from 'Lucky Strikes.' All that he was capable of, was that he could fit an arrow to a country bow and let it fly miles afar or drive a chariot fitted with white horses, as though possessed, with energy, with vigour, with devilry and an abandon.

This uninteresting man from our modern standards, was stuck on Subhadra, sister of Krishna. She was of course a very sprightly girl. They were already related. He thought a marriage would cement the bonds. Though he could not foresee his own marriage he knew that all the future important alliances would be arranged in that fashion.

Whenever he went to Dwaraka, Subhadra took some pretext or other to talk to him. Her smiles were encouraging and her looks spoke volumes of love. They whispered in gardens, exchanged glances in dining halls, possibly stole a stray kiss in the corridors. Eventually, of course, he married her and added one more matrimonial announcement in the next day's newspaper.

But unfortunately, Arjuna, in spite of his strong desire to be above board, in spite of his *bonafide* intentions to live up to his contractual nay, sacramental obligations, was running into one escapade after other and appeared to prove that 'Consistency is the virtue of an ass.' One instance was, when he was on a expiatory pilgrimage as a Sanyasin, he was physically removed by a damsel from the underworld to her abode. After taking him there, she charged him that he violated territorial integrity. In that land nobody could invoke '*Habeas Corpus*' and the lady had the last say in the matter. Arjuna escaped but was sorely troubled in heart which was a smouldering cauldron. Why did he stumble always in the case of women as though the very Saturn directed his footsteps ?

If it is so in the case of Arjuna, what about us poor folk, I thought.

My University Education prompted me "Why do you believe in these silly tales. Probably Arjuna himself was a myth. Go to the English sources. They have made even their fiction historical. And their history reads like fiction." So I consulted Brother Shakespeare.

Just read the Prologue of 'Romeo and Juliet'

'From forth the fatal loins of these two foes,
A pair of Star Cross'd lovers take their life'
And then the story is developed. When Romeo sees Juliet, he, in the veritable Shakespearean style bursts out in the blank verse :

"Oh she doth teach the torches to burn
bright

It seems she hangs upon the cheek of
night

Like a rich jewel in an Ethiop's ear."

Romeo (To Juliet) : If I profane with my
unworthiest hand

This holy shrine, the gentle sin is this ;

My lips, two blushing pilgrims, ready
stand

To smooth that rough touch with a tender
kiss.

Juliet :

Good Pilgrim, you do wrong, your hand too
much

Which mannerly devotion shows in this.

The enmity between the Montagues and Capulets ends with the death of the two lovers.

Again a conquest and aggrandizement. Disaster piled over disaster. A rise and fall of a Roman Empire/Gloucester (later Richard the III) who literally walks through blood to the throne of England, the ugly hunch backed creature, fits villainy only as a second string to his fiddle.

"But, I, that am not shap'd for sportive tricks

Nor made to court an amorous looking glass ;

I, that am rudely stamp'd and want love's majesty.

To strut before a wanton ambling nymph ;
I, that am curtail'd of this fair proportion
cheated of feature by dissembling nature,
Deform'd, unfinish'd, sent before my time into
this breathing world, scarce half made up
and that so lamely and unfashionable.

That dogs bark at me as I halt by them.
Why, I, in this weak piping time of peace
Have no delight to pass away the time
Unless to see my shadow in the sun
And descant on mine own deformity :
And therefore, since I cannot prove a lover
To entertain these fair well spoken days.
I am determined to prove a villain."

He desires not exactly passionately, because he is conscious of his deformity, but politically, the hand of Warwick's youngest daughter. Unfortunately she was already married. But that is no problem to a 'determined villain.' He sticks a blade in the heart of the unfortunate husband without a twitch of the conscience and despatches him to keep company with his father-in-law.

He reasons out :

"What though I kill'd her husband and her father

The readiest way to make the wench amends

Is to become her husband and her father."

He encounters her when she was on her way to Chertsey with her husband's coffin to be interred there. Gloucester does not allow grass to grow under his feet. It was never his practice ! His motto was 'Nothing like the present.' A conversation ensues between Anne

and Gloucester, with the dead husband to preside over.

"Your beauty, that did haunt me in my sleep

To undertake the death of all the world

So might I live one hour in your sweet bosom "

And he ends up by saying, when she looks at him scornfully.

"Teach not thy lip such scorn, for it was made

For kissing, lady ; not for such contempt."

A grand, inimitable villain indeed, before and 'ambling nymph.'

We have all read that History repeats itself. Let me modify it by saying, "History repeats itself, sometimes partially if not fully." I am neither a villain of the order of a Gloucester nor a lover of a Romeo's magnitude nor of Arjuna's calibre. In spite of strict exhortations from the wife not to divulge any episodes that relate to our pre-marital status—There are penal provisions in the "Domestic Secrets Act" for infringement—I cannot help taking my readers into confidence. One day as my luck or ill-luck would have it, I met her in the bus. Unusually, the aggression, it looked started, from the other end. Her eyes moved here and there and came to rest on me. In the language of contracts the looks indicated a 'proposal'. At least that is what I made out. I want time to consider the proposal. If I took too much time, the offer may lapse. I was hesitating. An idiot who was sitting by her side vacated the seat. Ominously I slumped down in that seat. I was afraid to look. She was smelling lavender. She gazed out. I gazed in. New Globe came. I got down. She got

(Continued on page 44)

A VISIT TO "LITERATURE IN ROCK"

BY

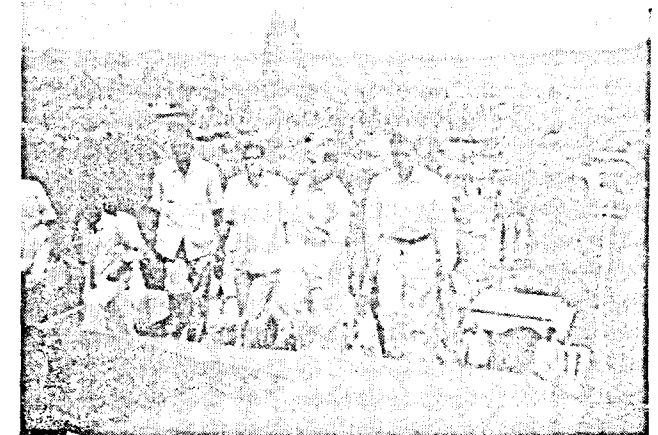
M. N. KRISHNAMURTHY—WARDKEEPER

Few lands can rival India in its geographical diversities. From the tropical southern tip of the peninsula to the temperate North, stretching over two thousand miles, the country offers a rich variety of soil, flora, and fauna ; beautiful sceneries and enchanting sights ; races and places. We the people of the Indian homeland, stand for the sum of all that our ancestors through ages past have taught and done. We are also in part, the product of influence and pressure exerted from outside. By that influence and instinct, the staff of the Depot Stores made a trip to Mahabalipuram on the 13th day of July under the guardianship of Sri R. K. Tandan, Sri T. S. Jayaraman and Sri K. K. B. Panicker. The trip was sponsored by the newly-formed "DEPSTO ORGANISATION."

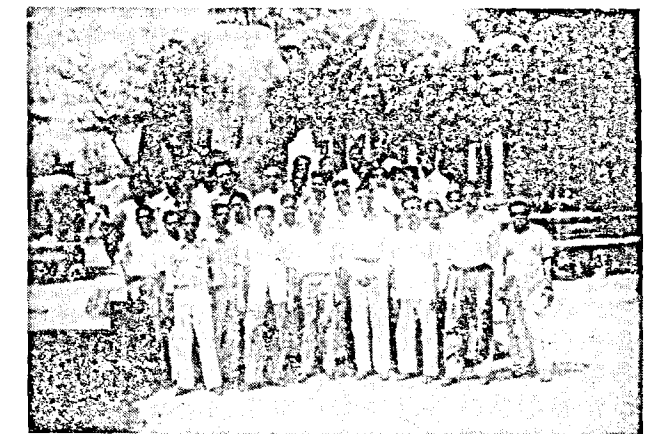
The members of the party assembled at the I.C.F. Institute at 7.00 a.m. and left by a special bus at 7.30 a.m. for Tirukazhikundram. The members were in a gay mood ; some playing musical instruments, others whistling and still a few others, singing songs in their regional languages. We had the pleasure of even a few classical songs.

The party halted briefly at Chingleput, for breakfast ; and reached Tirukazhikundram at 10.15 a.m.

We climbed the hill, and had 'Darshan' of the presiding deity. But, the principal attraction of the place is the two sacred birds taking their food from the hands of the 'Purohit.' Legend has it that these birds, on their way to Rameswaram from Kashi, have their mid-day meals at this spot. So, here we are, the Indians, inheritors of a fascinatingly long and chequered history, each of the many strands, combining



Climbing up the hill is not an easy task—The advance party, with Sri R. K. Tandan, Dy. COS.



The Excursion Party.

to form the Nation, adding its special shade of colour or a sudden flash to the intricate pattern of our national life. The 'darshan' of these birds coming as it seemed from nowhere, and having their feed and then again departing to an unknown place, is one such example. After lunch, the party proceeded to Mahabali-

puram, reaching that place by 2.00 p.m. The weather being rather pleasant, we were able to enjoy to the maximum, the bounties that Nature had to offer.

Mahabalipuram is an ancient and historic place, retaining most of her past splendour; the imperishable, artistic and creative talents of the Pallava age, one of the many reminders, if reminders are necessary of the 'Golden Age.' Superb specimens of ancient sculpture are found in the magnificent rock cut temples, which have often been described as 'prayers in stone' or 'literature in rock.' Among these are the remarkable five chariots of the Pandavas; the sea-shore temple, and the S.T. Museum, where sculptures of our ancient and forgotten dynasties are preserved. We had also been to the light-house, both ancient and

modern. Even here, the architectural difference was distinct.

Next, we went towards the sea-shore. From there, we had a magnificent view of the vast expanse of water. The ocean, deep and blue, with the distant horizon, held us enchanted! Even the majestic but rhythmic on-rush of the waves towards the shore did not disturb us from that enchantment.

Round about 5.00 p.m., with greatest reluctance, we boarded the bus on our journey back to the hustle and bustle of the metropolis. By the time we returned the sun had set and the stars were twinkling in the sky.

Thus came to an end a most pleasurable spent day; and everybody agreed before dispersing that we should have many more such days in future.

Vive la Mahabalipuram

Dependable Manufacturers & Suppliers of

- ★ Brass, Gunmetal, Cast iron Water, Steam and Boiler fittings, viz. Valves & Cocks as per specifications and drawings.
- ★ Water and Steam pipes, Pipe fittings, Laboratory and Sanitary fittings, C. I. Pipes & specials thereof. R. W. Pipe fittings.
- ★ Boiler Tubes & Cold-drawn seamless tubes.
- ★ Tube-well Electric pumping sets, Boring Pumps and accessories.
- ★ Bolts & Nuts, Steel-spring wires & Flats, Barbed wire, etc.

GOVARDHAN DAS, P.A.

(The people who know water control best)

H. O. & Works:

Govardhandas Road

JULLUNDER CITY

Madras Office:

13/81, SEMBUDOSS STREET

Phone: 55529

MADRAS I

Gram: "GATEVALVE"

BOMBAY - CALCUTTA - DELHI - KANPUR - AMRITSAR

Brain teasers

1. Arun stakes $\frac{1}{5}$ of his fortune on each try of a game with 50:50 probability. He makes 6 tries staking each time $\frac{1}{5}$ of what he possesses and notices that in all he has won thrice and lost thrice. If he started with 25 rupees, how much did he have in the end?

2. Two tram stations, 6 miles apart are connected by a double line track. Tram-cars set out from each of these stations every 3 minutes and proceed at uniform speed. A pedestrian leaves one station just as one tram car arrives and another leaves. He walks at a uniform speed and finds that at the time he reaches the other station there is one tram arriving with him and one starting out. Besides the four tram cars he met 58 more on his way of which 17 were going in the same direction as his. What are the speeds of the tram-cars and that of the pedestrian?

3. A suit of 13 cards, the ace, king, queen, jack, 10,.....2 of spades, is arranged in a certain order. The first card is taken off the pack, the second is put at the bottom, the third is taken off, the fourth is put at the bottom and so on. What was the original order if the order in which the cards were taken off was ace, king, queen, jack, 10,.....2?

4. The lawn-tennis tournament in our club was played on league basis each player playing one set against each of the others. The result was interesting as each player won the same number of sets. I began by conceding a love set to Seenu but in the end I won just as many games as I had lost. Logu also had his luck like me. Incidentally half the games I lost were in the set I played against Logu.

What was the result of the match between me and Logu?

5. Pitambar Lal on his return from a tour of the West held a party to convey his impressions

to his friends. In the course of the discussion he narrated a funny problem with which he was posed in a Paris Hotel. He had dined with five stars and their wives and was surprised to learn that each of the five wives had previously been married to each of the other four ladies' present husbands. More astonishing fact was that the marriages always used to take place among themselves simultaneously. More facts to follow were:—

Paule was then married to DeHau's second wife.

Tassu's then wife was last married to DeHau.

Paule's first wife was Tassu's second.

DeLab's then wife was Tassu's third.

George's third wife was next married to DeHau.

Who was the husband of George's second wife in the party?

6. I am said to be living in nine words:—
The first letter is in rat but not in cat.
The second is in ass but not in donkey.
The third one is in ink also in inch.
The next is in like also in dislike.
The fifth is in cow but not in ox.
The next is in orange but not in apple.
The seventh is in above but not in below.
The eighth is in cover but not in power.
The last is in hand but not in band.
On the whole I am now with you. Who am I?

Solutions to last month's teasers

1. Billoo is Dhanna's son and books purchased by each individual are as follows:—

Manna—11, Jilloo—3, Dhanna—7 and Billoo—9.

(Continued on page 42)

Wit and Whistle

1. A passenger train which was stopping at each and every station and between stations hours together at last stopped near an open space. A disgusted passenger approached the Guard of the train and coolly said, "Shall I gather some flowers?"

"Flowers, where are they?" exclaimed the Guard.

"No. I have got some flower seeds" the passenger replied.

2. The Judge suggested, "I feel that most of these cases need not be settled here" obviously meaning that they could as well be settled by lower courts.

The accused promptly told the Judge, "Your honour, in fact that is exactly what I tried with the policemen when they rounded me."

3. The lawyer was trying his best to save his client from the charges of murder. So he was searching very hard for an alibi. He asked the client, "Did anybody see you actually in person round about the time while this murder is supposed to have been committed? Tell me honestly and this is your only chance."

"Thank God, sir, fortunately none" was the cheerful reply.

4. The enthusiastic client asked the insurance agent, "Suppose I were to insure for Thirty thousand rupees to-day on the life of my wife and unfortunately she were to die to-morrow, am I eligible for anything?"

"Of course, yes" said the Agent "for a charge sheet."

5. The Judge had the rarest of opportunities. He had before him his old school mistress charged for passing through a red signal. Deciding to take the fullest advantage of it, he announced, "Madam, your presence here fulfils a long cherished desire of mine. Now please go over to that corner and write 'I passed thro' a red signal' one thousand times!!"

6. Two friends were discussing about a reckless driver. "I am unable to find out a method by which that man can avoid accidents" said one.

"The only way I can think of is that the roads should turn the way he does" said the other.

(Continued from page 41)

2. The guilty six were placed at the following places :—

4, 10, 15, 20, 26 and 30.

3. Mani's age is 33 and his children are respectively 8, 2 and 1.

4. The two probable solutions are 13 and 11. The denomination of the currency note could

have been only one, two, five, ten or hundred rupees.

One rupee + one naya paisa = 101 nP., but 101 is a prime number. Also $201 = 67 \times 3$, $501 = 167 \times 3$ are not fitting probabilities. 10001 being out of question, 1001 is only probable solution, which gives values as 13×77 or 11×91 .

5. The difference is $15/16$ of a mile.

6. $0 = 1$, $D = 9$, $E = 2$ and $R = 6$.

NEWS MAKERS

Our Felicitations to

1. Shri R. Muthuswamy, DSK in scale Rs. 260-350, Depot Stores, promoted DSK in scale Rs. 300-400 with effect from 14-7-1958.

2. Shri V. Achuthan Nair, Chief Clerk in scale Rs. 200-300, Dy.COS's Office, promoted Assistant Office Superintendent in scale Rs. 260-350 with effect from 23-6-1958.

3. Sri S. Narayanaswamy, ASK in scale Rs. 200-300, Depot Stores, promoted DSK in scale Rs. 260-350 with effect from 14-7-1958.

4. Shri R. Somasundaram, Head Clerk in scale Rs. 160-250, Dy.COS's Office, promoted Chief Clerk in scale Rs. 200-300 with effect from 23-6-1958.

5. Shri P. G. Subramanian, Stenographer in scale Rs. 80-220, Stores Department, promoted Stenographer in scale Rs. 200-300 with effect from 25-7-1958.



Shri T. Natarajan.

Our welcome to

1. Shri K. M. Aiana, Dy.CME transferred from the Western Railway and posted Deputy Chief Mechanical Engineer/Furnishing with effect from 18-7-1958.

2. Shri T. Natarajan, ACOS transferred from the Southern Railway and posted ACOS/Depot with effect from 12-7-1958.



Shri K. M. Aiana.

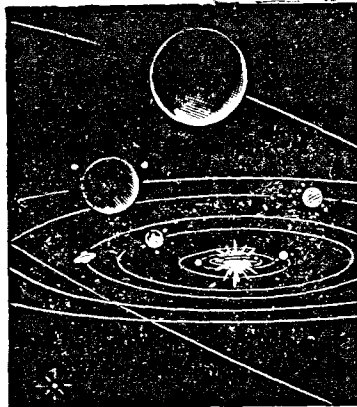
(Continued from page 38)

down. Rather we both got down. I had my seat reserved and so I wanted to escape from the danger zone. I managed to effectively evade her, and went to the Ice Cream Parlour. I wanted to cool down with a *Coca Cola*. The show started. The attendant with a battery light conducted me to my seat. Before

I sat down, I evoked an angry articulation backed by an explosive monosyllabled epithet 'ass.' Must have trampled hard. Somebody's girl or somebody's mother quite likely. I perspired. When my eyes got acclimatized to the darkness, I perceived the aggrieved author of the protest.

She was the girl in the bus.

DID YOU KNOW ?

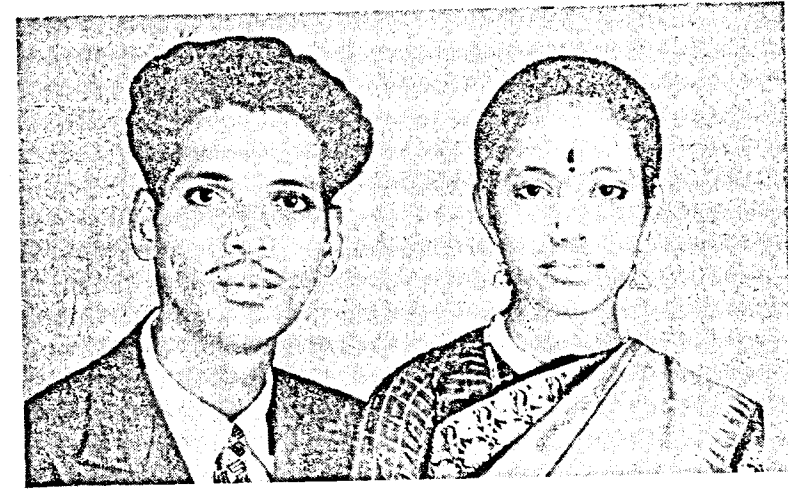


Our solar system has nine major planets, including the earth, which revolve around the sun in definite orbits. The remotest of these, as measured from the sun, is Pluto. Its mean distance is 3,675,300,000 miles. Mercury is the nearest (36 million miles). The earth is third (92,900,000 miles).



Contrary to widespread belief it is not true that when an ostrich wishes to hide, it buries its head in sand and imagines it cannot be seen because it cannot see. Experts say the ostrich is really looking for or drinking water, which creates the appearance of "burying" its head.

WEDDING BELLS

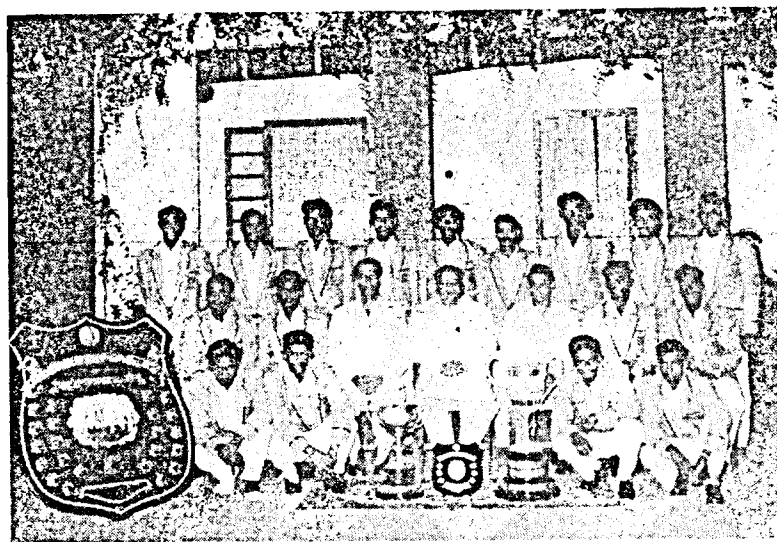


Shri M. Loganathan, Fitter, Shop 22 was married to Kumari Pushpavathi on 6-7-58 at Maduranthagam.



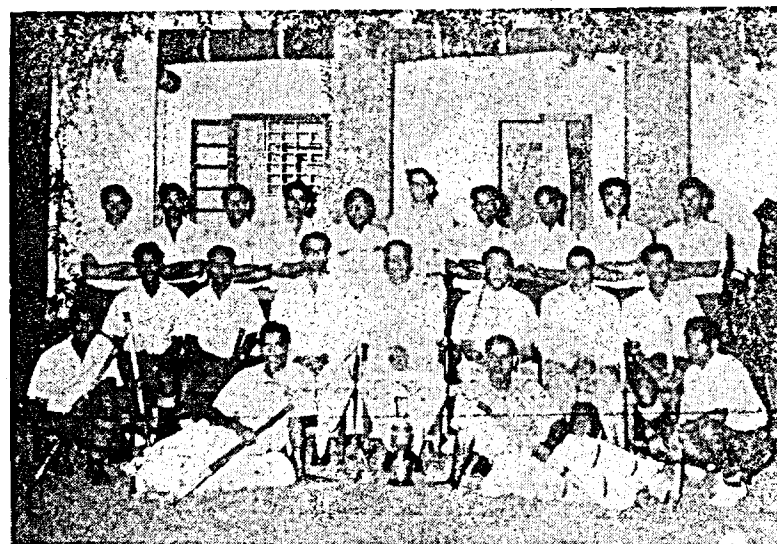
Shri Someswar Mukherjee, Welder, Shop 22, was married to Kumari Anjali Mukherjee on 13-7-58 at Narayanpur West Bengal.

OUR BEST WISHES TO THE NEWLY WEDS!



I.C.F. FOOT-BALL TEAM WITH THE C.A.O.(R)

Kneeling L to R: C. T. Thomas, R. Rajaram, A. C. D' Cruz, A. Raghavan.
Sitting " A. D. Parthasarathy (Coach), M. Ganapathy, D. R. R. Sastri (Sports Secretary), K. Swarup (President), C. G. Devaya, P. Janakiraman (Captain), Stephen Shedrack (Vice Captain).
Standing " R. Sivasankaran, S. Kuppuswamy, K. G. Arumugam, A. D. Sreenivasulu, D. Kannappan, Syed Rahim Pasha, M. Selvaraj, B. P. David Martin, A. N. Williams.



I.C.F. HOCKEY TEAM WITH THE C.A.O.(R)

Kneeling L to R: Pandurangam, A. D. Sreenivasulu, Jordon, Dhan Singh.
Sitting " Muruges, Bhaskaran, D. R. R. Sastri (Sports Secretary), K. Swarup (President), M. Lal (Member-in-charge), C. G. Devaya, Jabbar Pasha.
Standing " R. Smith, Sreenivasulu Reddy, Stephen, G. Ireland, A. D. Parthasarathy (Coach), E. Colomb, Thulasingham, Ganesh, Syed, Natarajan.

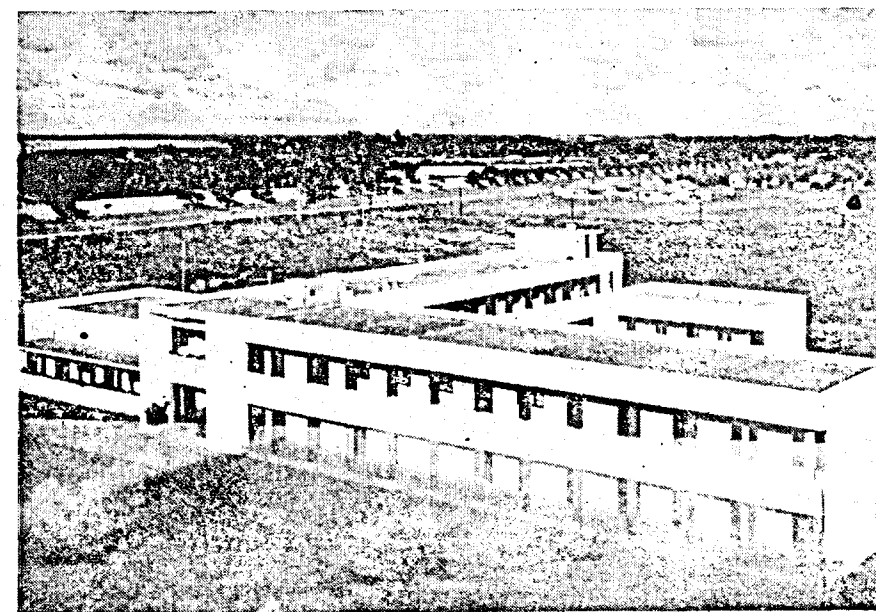
Edited and Published by K. Santhanam, Principal, Technical Training School, Integral Coach Factory, Madras 23 and Printed by M. G. Daniel, at Thompson & Co. Private Ltd (Minerva Press) Madras 1

RAILCOACH

VOL. II, No. 12



SEPTEMBER 1958



An aerial view of the Technical Training School

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

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)		
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		

Mechanical Data

Blocks	Screen 100
Full page	8" x 5 1/2"
Half page	4" x 5 1/2"
Quarter page	4" x 2 3/4"
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

Schlieren Coaches

for Indian Railways

SWISS CAR AND ELEVATOR MANUFACTURING CORP. LTD. SCHLIEREN-ZURICH SWITZERLAND

PEDDINGHAUS

UNIVERSAL STEEL
WORKERS

With Z- or Automatic Blades

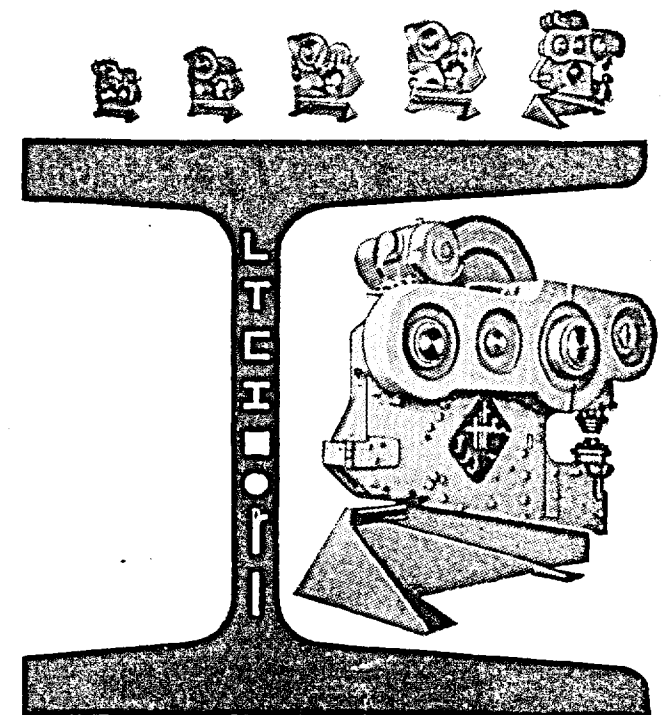
CAPACITIES

Size	Plates	Angles	Punches
11	3/8"	3" x 3" x 5/16"	7/8" x 7/16"
			3/4" x 1/2"
13	1/2"	4" x 4" x 1/2"	1" x 5/8"
			13/16" x 3/4"
16	5/8"	6" x 4" x 1/2"	1.1/16" x 3/4"
			7/8" x 7/8"
20	3/4"	6" x 6" x 1/2"	1.3/16" x 7/8"
			1" x 1"
25	1"	7" x 7" x 5/8"	1.3/8" x 1"
			1.3/16" x 1.1/8"

Sole Distributors

**Francis Klein & Co.
Private Ltd.**

1, India Exchange Place
CALCUTTA-1



ORIGINAL PEDDINGHAUS

Resident Engineer in South India :

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

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.

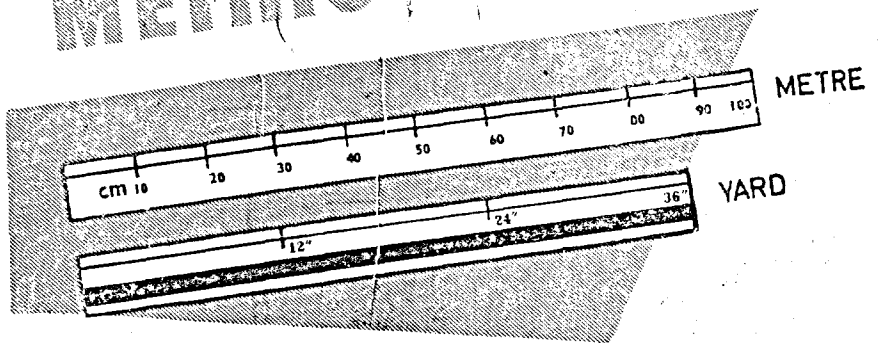
Annual Subscription Rs. nP.
... 3 00

CONTENTS

SEPTEMBER 1958

	PAGE
Editorial	5
Suggestions and Inventions accepted during August, 1958	6
News and Notes	8
The Professional Aspects of Industrial Engineering	11
March of Science	20
President's call to the people on Independence Day	22
Amenities for Passengers in Railway Travel	23
Steps to minimise occurrence of accidents on Railways	24
Self-sharpening Grinding Wheels	25
Inspection and Maintenance of Alternating Current Motors	30
Independence Day Celebrations in the Integral Coach Factory	33
ICF Colony Aided Elementary School Annual Day Celebrations	34
At the Bus Stop	35
Visitors to the Factory	37
Brain Teasers	38
Wit and Whistle	39
News Makers	40

WHAT IS THE METRIC SYSTEM?



The Metric System derives its name from the Metre, which is the primary unit for measuring length. In this system, as in all decimal systems, the basis of calculation is 10. We multiply or divide any unit of length, weight or volume by the same number i.e. 10.

($10 \times 10 \times 10 = 1,000$ times).
The sub-units have the prefix *Deci* ($1/10$) *Centi* ($1/100$) and *Milli* ($1/1,000$).

THE CHANGE-OVER TO THE
METRIC SYSTEM OF WEIGHTS
AND MEASURES BEGINS
FROM OCTOBER, 1958

In the Metric System, the multiples of a unit have the prefix *Deca* (10 times), *Hecto* ($10 \times 10 = 100$ times) and *Kilo* ($10 \times 10 \times 10 = 1,000$ times).

KNOW THE METRIC LENGTHS	The primary unit of length is THE METRE = 40 inches approx. 1 kilometre = 5 furlongs	SUB-UNITS 10 millimetres = 1 centimetre 10 centimetres = 1 decimetre 10 decimetres = 1 metre MULTIPLES 10 metres = 1 decametre 10 decametres = 1 hectometre 10 hectometres = 1 kilometre	DA 58/109
-------------------------	--	---	-----------

ISSUED BY THE GOVERNMENT OF INDIA

editorial

ELEVENTH ANNIVERSARY OF ATTAINMENT OF FREEDOM

There was a marked difference in the manner in which the Independence Day was celebrated this year. The usual rejoicings were there, but there was a note of austerity. Perhaps that is how it should be as the economic freedom is yet to be won. The responsibility for seeing through the plans is still on us and there can be no slackening till our goals are achieved. So far as we of the I.C.F. are concerned we have before us the achievement of a further accelerated target, viz., of turning out 400 shells in a year. We are well set on the road to success and with the continued enthusiasm and zeal we are bound to realise the targets set.

The celebrations were unique in that considerable emphasis was laid on the cultural and other similar activities. The drama put up by our staff under the auspices of the Ayanavaram Amateurs was of a high order and was a fitting end for the day.

Monthly Outturn

		Target figures		Actual figures	
		K.D. coaches	Indigenous coaches	K.D. coaches	Indigenous coaches
August, 1958		5	20	6	26
Cumulative total for the first 6 months of the year 1958-1959		25	90	32	114

SUGGESTIONS AND INVENTIONS ACCEPTED DURING AUGUST, 1958

I. Suggestions by Sri S. Balakrishnan, Turner, T. No. 164, Shop No. 16.

(i) Boss to Drawing No. T. 04.004.03 to be manufactured from waste piece of collar to Drg. No. T.02.004.01.

The question of manufacturing the same bosses has been under consideration of the Production Office, but it was found from calculations that greater savings accrue by utilising the off-cuts from collar as suggested instead of from spring seats. The annual savings in this case would be Rs. 314.52.

(ii) In first setting of spring seat to Drg. No. T.01.007 a solid piece of 4" O.D $\times$ 7/8" length of material is rendered surplus. From these off-cuts, rings for filling pipe drawing No. T.6.3.115 can be manufactured.

The suggestion would result in an annual saving of Rs. 819.36.

(iii) At present 5'6" length material is supplied for doing a tube of 1 1/4" $\times$ 1" $\times$ 5'6" length to Drg. No. T.26.002.01 and off-cut of size 1 1/4" $\times$ 1" $\times$ 6 1/2" results. These off-cuts can be used for Hub Tube Drg. No. T.14.016.02.

The savings in this case is only in the cost of material as the operations remain identical and it works out to Rs. 240.36 annually.

These 3 suggestions have been accepted by the Committee and in appreciation, Shri Balakrishnan was awarded a sum of Rs. 100.

II. Suggestion by Shri A. Subramanyam, Welder T. No. 110, Shop No. 13.

At present, Bracket Drg. No. T.33.052.01 is being cut from 3/8" M.S. plate. The off-cuts available from the above work can be used to cut fix flanges Drg. No. T.26.002.02 which are of same 3/8" material and flanges sheared to the required size.

Investigations made by the Production Office have, however, found that if the off-cuts are gas cut into flats and then cut on a hack-saw machine an annual saving of Rs. 521.40 would be effected. The Committee accepted the suggestion with the modifications and Shri Subramanyam was given an award of Rs. 50.

III. Suggestion by Shri R. Jayaraman, Machinist, T. No. 10/118, Shop No. 10.

From Drg. No. T.14032.01 scrap pieces are available after the steps sheets are cut out. These could be utilised to manufacture 7 items viz., (1) Rib. Drg. No. T.11.025.02 (2) Rib. Drg. No. T.12.031.01 (3) Rib. Drg. No. T.12.034.01 (4) Support Drg. No. T.11.038.02 (5) Strip Drg. No. T.14.013.01 (6) Lug. T.14.082.03 and (7) Fixing plate Drg. No. T.15.016.03.

Investigations showed that items 1 to 3 only can be manufactured out of the said triangular waste pieces and an annual saving of Rs. 1,390.56 would accrue. The Committee has accepted the suggestion and Shri Jayaraman was awarded a sum of Rs. 100.

IV. Suggestion by Shri K. S. Rajagopalan, Mistry Gr. II, T. No. 003, Shop No. 14.

For Entrance Hand Rail Drg. T.26.002.01 raw material is being cut to 5'6" in the "Roma Tube cutting machine" and ground before bending at both ends in the Tube bending machine. About 6" in length are cut at both ends after bending and before fixing it on to the flanges. Raw material could be cut to 4'9" only instead of 5'6" as per the original drawing and the ends bent as usual.

This method reduces material cost by Rs. 6,181.92 per year. The Committee accepted the suggestion and Shri Rajagopalan was awarded a sum of Rs. 200.

V. Suggestion by Shri A. Mohan Kumar, Fitter Apprentice, T. No. 821, Shop No. 14.

In the manufacture of Hand Rails Drg. No. T.26.002.01 instead of bending two tubes of 4'9" length one tube of 9'2" length can be cut and bent to a 'U' shape and then cut in the centre, thereby saving 2 separate bending operations.

A saving of Rs. 2,966.76 per year will accrue as a result of the implementation of this suggestion. The Committee accepted the suggestion and Shri Mohan Kumar was awarded a sum of Rs. 100.

VI. Suggestion by Shri G. Madhava Raj, Skilled Fitter, T. No. 100, Shop No. 14.

The connecting pipe line between Main Brake piping and Release valve T.35.026.01 is cut to 2'6" and after deburring is bent at 45° at one end by the Tube bending machine and then to 15° at the other end by gas heating. Pipes to lengths 17.5/8" could be used instead of lengths of 2'6".

The suggestion as it is could have been implemented but for the fact that for the 11th batch onwards the Drg. has been altered to 19 7/8" length. According to the altered drawing No. T.25.028.01 there will be a saving of Rs. 659.40. The Committee accepted the suggestion and Shri Madhava Raj was awarded a sum of Rs. 50.

VII. Suggestion by Shri V. Moses, Head clerk, Personnel Branch, CAO(R)'s Office.

Pay, dearness allowance, city compensatory allowance and house rent allowance are calculated with the help of the printed Naya Paisa Ready Reckoners. The calculations in respect of overtime under Normal Rules, Factories Act, deductions for short hour absence in respect of wages and dearness allowance are worked out since there are no printed Ready Reckoners for that purpose. Shri V. Moses has devised a Ready Reckoner for making these calculations, which results in considerable saving of time and labour.

The Committee accepted the suggestion and Shri Moses was awarded a sum of Rs. 30.

NEWS AND NOTES

Railway Minister's Press Conference at Madras

The Hon'ble Shri Jagjivan Ram, Union Minister for Railways, told a Press Conference during his visit to Madras that the electrification of the railway line between Tambaram and Villupuram has been included in the Second Five-Year Plan for implementation, but obviously the delay in execution was due to foreign exchange difficulties.

The Railway Minister denied that there was any proposal to stop with the electrification of Tambaram-Chingleput section and proceed with the electrification of Madras-Arkonam section instead of the implementation of the entire Tambaram-Villupuram electrifications scheme.

The Minister said that the railway authorities had already started the civil engineering work for the electrification of Tambaram-Villupuram section. As, at some stages, there was difficulty about the availability of power, they had to synchronise the availability of power with the completion of the scheme.

Asked about the prospects for making third class travelling comfortable in the near future, the Railway Minister said that the prospects were bleak at any rate during the Second Five-Year Plan period. Replying to the question why the Railways were offering concessional return tickets even though there was overcrowding in the trains, the Minister said that there were certain slack seasons during which many people were not going to hill stations and the businessmen residing in hill stations complained that they had been severely affected. So concessions were offered to tourists to go to the hill stations "I personally am not in favour of any further concession in these matters," he said. However, he had no intention of withdrawing any useful concession which was subsisting.

Explaining the extent of overcrowding, the Railway Minister said it had been computed that any particular moment, passengers equalling in number to the combined population of Delhi and Bombay were on the move in the trains all over the country. Persons who travelled with railway passes in a year numbered 66 lakhs, he said.

Referring to the Janata Express trains the Minister said they had become very popular and that he would like to introduce as many trains of that class as possible. But the possibility of placing orders for additional coaches was very remote, as foreign exchange stood in the way. There was a scheme to introduce the second shift in the Integral Coach Factory, Perambur, and they were planning to send some persons for training abroad. But due to non-availability of foreign exchange, which was required to obtain machinery, the introduction of the second shift had to be postponed.

Referring to criticisms about the late running of trains, the Railway Minister said he personally felt that there was scope for improvement. There could be better performance than what was being done. But his difficulty was that he could not lay more emphasis on punctuality in view of the engineering works going on in the tracks. Also, during rains they had to be a little careful.

As regards amenities, the Railway Minister said that it was their programme to electrify all stations where electricity was available.

Railway record during Second Plan

The Indian Railways have made considerable progress in building up their rolling stock during the first three years of the Second Five-Year Plan.

Of the total outlay of Rs. 380 crores provided under the Plan for rolling stock of various types, the Railway Board has already approved of the purchase of rolling stock of the value of Rs. 370 crores. Bulk of the purchases will be made from manufacturers in India. (The total amount allocated for railway development under the Plan is Rs. 1,125 crores).

Since the Plan began, the railways have received over 1,150 locomotives, 2,500 ordinary passenger coaches, 170 electric multiple coaches and 62,000 goods wagons. Part of this rolling stock has gone to replace worn-out stock condemned since the plan commenced.

The Chittaranjan Locomotive Works have in recent months touched a new record by turning out a complete locomotive every alternate day.

Diesel cars from Australia

Twelve diesel rail cars and components for 660 rail wagons from Australia arrived at the Madras Harbour by S.S. "Christan Smith" on August 6.

This consignment completes a major Colombo Plan project under which Australia agreed to supply India with 24 complete diesel rail cars and 2,000 unassembled metre-gauge rail wagons. The first batch of 12 diesel rail cars were delivered in January 1958 and are now in service in the Southern Railway. Components for a total of 1,340 rail wagons had also been delivered then and assembled.

These rail cars have double-end drivers' controls with a seating capacity of 82 passengers and a maximum speed of 80 m.p.h. Each car is valued approximately at rupees six lakhs. The Colombo Plan project is designed to assist the development of the Indian railway system during the Second Five-Year Plan period. The total value of the project is approximately four crores of rupees.

Sleepers for railways

The Government of India are trying to get wooden sleepers for the railways from the world market at as cheap a rate as possible.

The Government of India have accepted certain tenders for the supply of sleepers and ordered 2.5 lakhs of sleepers for the broad gauge lines from the United States and 9.6 lakhs of sleepers for the broad gauge and 7.91 lakhs of sleepers for the metre gauge from Australia.

The sleepers ordered from the United States are treated ones, requiring the use of bearing plates, while those ordered from Australia are durable ones, not requiring the use of bearing plates.

Arkonam-Jalarpet section

The first lap of double lines laid between Arkonam Junction and Chitteri station, a distance of 5 miles in the Arkonam-Jalarpet section, was declared open to all traffic by Mr. D. B. Patel, Divisional Superintendent, Royapuram on 15-8-58.

Mr. B. Bakthavathsalu Naidu, Deputy Speaker, Madras Legislative Assembly presiding over the function, explained that the railways were the property of the Indian people and so every Indian had the responsibility to see that the railways proved an asset to the nation. Pilfering of railway property, he added, should be checked.

The work was finished within the scheduled time.

A Ballast train steamed out on the line soon after the close of the function.

First-class return railway tickets

From August 15, 1958, First class Return Tickets will be issued at two single journey fares between Madras Central to Hyderabad (Deccan) and *vice versa*, and Madras Central to Secunderabad and *vice versa*, available for

18 days from the midnight of the date of commencement of the outward journey.

Passengers desiring accommodation to be reserved for the return journey may give a written application therefor, at the starting station. A message will be sent to the destination station for arranging reservation for the return journey, but reservation ticket for the return journey will be issued only on the destination station confirming that accommodation has been reserved. Requests for reservation of accommodation for the return journey will not be entertained earlier than 10 days prior to the date of commencement of the return journey.

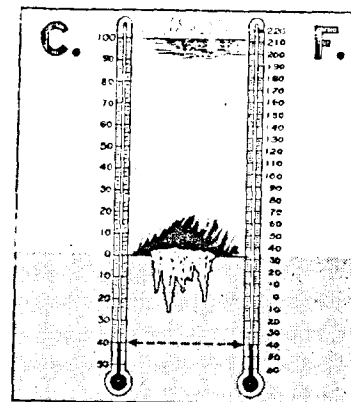
Review of accidents on Indian Railways

The Railway Board was preparing a review of accidents on Indian Railways over the last 20 years and it would be placed before Members of Parliament, the Railway Minister told the Rajya Sabha on August 21, 1958.

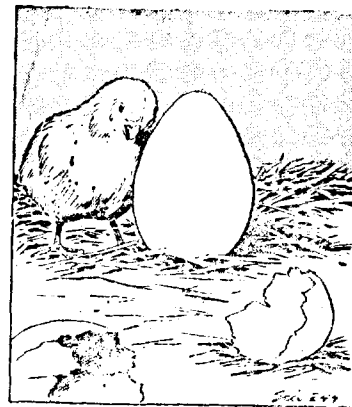
The Minister continued, "We are equally anxious and sorry for the accidents that have been taking place. We have taken certain steps to inculcate a sense of responsibility amongst the staff connected with the running of trains. In spite of all these actions, there have been cases of failure of the human element and in most cases we find this is due to non-observance of rules. We are tightening up supervision and I expect some results will be produced."

He also said that ordinary disciplinary proceedings took a long time and people by then forgot the seriousness of the accident concerned. General Managers of Railways were now authorised to take quick action in cases where due to failure of the human element, accidents had been caused.

DID YOU KNOW ?



Forty degrees below zero is the only point at which the centigrade and Fahrenheit thermometers coincide exactly.



Eggs set on their large ends will not hatch. The air cell is located in that end, and the weight of the contents destroys it.

THE PROFESSIONAL ASPECTS OF INDUSTRIAL ENGINEERING

BY

PROF. R. F. BRUCKART

(Prof. R. F. Bruckart, Professor of Industrial Engineering at the Institute of Technology, Kharagpur, gave three lectures on Industrial Engineering at Bangalore from 7th to 9th April 1958 at a Seminar organised by the Industrial Engineering and Administrative Section of the Indian Institute of Science. The first of these lectures is reproduced in this issue—Ed.).

It is pertinent that we should explore the professional aspects of industrial engineering, for in an era when technological change seems to be coming at an ever-increasing rate, we can hardly afford to do otherwise. In harmony with this change and aiding it are the *electronic processing means* available and the *mathematical techniques* now undergoing research in the field of industrial engineering. Also we must consider the *shifting social values* in society and the *trends in labour relations* over the past decade or more. All of these factors are causing serious shifts in the approach required of the industrial engineer.

Definition of Industrial Engineering

First let us agree what is meant by industrial engineering. In recognition of the changing status of this branch of engineering, definition of its functions has also been revised to keep up with the times.

The American Institute of Industrial Engineers currently has adopted the following definition :

"Industrial engineering is concerned with the design, improvement and installation of integrated systems of men, materials and equipment. It draws upon specialized knowledge and skill

in the mathematical, physical and social sciences together with the principles and methods of engineering analysis and design to specify, predict, and evaluate the results to be obtained from such systems."

Growth of industrial engineering

Industrial engineering is an American development, and consequently in order to evaluate its potential it is most helpful to observe the trend in industrial engineering in the United States. The growth of the profession of industrial engineering from 1940 to 1950 can only be called phenomenal. As evidenced by U.S. Census figures, ¹ an increase of 376% in the number of industrial engineers occurred in that decade—a growth from 12,000 to 46,700. During this same period the overall engineering profession experienced a growth of 51% in individuals reporting some branch of engineering as their occupational speciality. During this period individuals listing industrial engineering increased 7½ times, or a figure of 376%, the total being 46,700.

Although there are reasons why this figure may be suspect—for instance the problems of categorizing for census purposes a lot of individuals who became specialists in management problems during the war forced considerable non-engineering individuals into this category. This had a lot to do with the breadth of the functions ascribed to the profession and the general vagueness in its definition. Many of these individuals might not be considered professional industrial engineers today. However, even if we discount the census figures

by 50%, the growth was still in excess of chemical engineering, the next leading engineering branch in growth during the period.

Colleges and Universities however have been unable to keep up with the demand for graduate industrial engineers. There were 1,200 graduates in industrial engineering and closely related curricula in 1955—a figure which is inadequate to fill the needs. Furthermore, demand for engineering teachers is expected to double in the next fifteen years.

This growth has been rather *uncoordinated*, generally *neglected* and *undirected philosophically* by the engineering groups of the Universities, and has lacked a professional body which could spell out the engineering objectives of the profession in which development could be concentrated.

Engineering has been defined as the “art and science by which the properties of matter and sources of power in nature are made useful to man in structures, machines and manufactured products.”²

It has been characteristic of the engineering profession in the U.S. to develop along the lines of problems currently needing solution in its economy and society. Thus it has been quite natural that when problems of organization and management in industry required systematic study by what is referred to as the “engineering approach,” the resulting subject material was grouped in what was referred to as “industrial engineering.” Developments during the War years were not characterized by the creation of *analytical tools*, so much as by the development of *descriptive techniques* that literally caused the problems to disappear by casting the light of systematic study on them.

These techniques are still basic and practical, and adequate for industrial engineering purposes. However, during the same period other engineering disciplines had undergone a fundamental shift from emphasis on the “practical”

and experimental approach—the *art* of engineering—to the greater use of mathematical methods of analysis refined through co-operation with applied scientists, mathematicians, and other engineering disciplines—the *science* of engineering began. Thus in the present-day engineering functions are characterized by the development and use of a considerable “research” function which develops analytical approaches and probes into the basic structure of our physical world. The same approach is entering the industrial engineering profession, offering the opportunity to develop in an accelerated manner along similar analytical and research lines. We can now attempt to define the profession of industrial engineering in terms of “engineering.”

The importance of the field of industrial engineering has been repeatedly demonstrated and the design of systems of industrial engineering application and analysis has been interesting and profitable for the industrialists and analyst. All of us already have or will find new techniques which indicate the importance of the design and analysis applied to complicated systems.

The usual applications of industrial engineering in the areas of quality control/production planning, production control, motion and time study, plant layout and material handling, tool engineering, wage incentives and so forth are familiar to all of us. In addition, applications of special techniques of industrial engineering have been adopted for other than production organizations in the usual sense. Particularly popular have been the methods-analysis and work measurement aspects of the industrial engineering process, and applications have arisen in many areas far removed from ordinary manufacturing organizations. Hospitals, post offices, rail-roads, and other public utilities, governmental agencies of all kinds, communication and transportation industries have adopted these techniques—and an almost

unlimited number of other applications have occurred.

The transition of such general applications to a professional status, in which a body of knowledge exists and on which basic principles may be established, is an important feature in the current status of industrial engineering.

Aiding the professional development of a branch of engineering such as this is necessary, so that its recognition may not cause years of wasteful manoeuvring and unguided drifting.

Professional Development :

The recognition that a branch of engineering is ready for professional status has followed well-established paths. Generally this acceptance implies that there is a fundamental understanding of the technical information used by the practitioner ; an understanding of the service which the users receive ; there is widespread recognition of its social obligations ; and clear recognition by the social world of the professional nature of the discipline.

The transition to professional status appears to follow certain stages ; the first stage is that a necessity exists for the service fulfilled by this function. That is, a milling machine had to be designed ; a chemical process had to be defined and established ; a system had to be laid out and so forth. When these problems first arose, no engineer was available to solve the problem. There were no specially trained persons with engineering degrees to fill the need. The problems were solved by use of logic, common-sense, empirical procedures. The people who did this were pioneers who established the foundations on which their engineering branch grew. These pioneers were necessary, as in no other way could any engineering branch have its conception.

The second step is the step of acquiring experience by those who repeatedly worked in this new branch of engineering. These experiences were gathered and refined, and

applied to other problems of a similar nature. Something new was learned through experience, and the foundations were established for this profession.

As some of the problems became more complex, the research areas began to develop. Thus the basic facts, supplemented by those of the academician and researcher, accumulated. In some instances these large amounts of data conflicted, and opposite conclusions were reached.

The third step occurs when these data become clearly established theories and the conflicting ideas are unified or combined with established practices and procedures.

At this stage, Colleges, Institute and Universities are essential for personnel in this field, for additional training is needed not only to grapple with today's problems, but to prepare for tomorrow's problems. Simple theories may be developed, but there is an unending development of learning and development through research and experience. More complexities arise, and theories are developed to interpret them, from which further development and research are initiated.

Thus professional status is achieved, for any branch of engineering—and so it is developed for industrial engineering.

The Position of Industrial Engineering :

Industrial engineering is now in the early stages of the third step of this movement towards professionalism. Many facts, ideas and much fundamental research has been reported, and we are in the process of putting these ideas together in the form of theoretical acceptance. We are faced with the birth of vastly important new concepts of industrial management and manufacture.

Automation is one of the important factors in the profession of industrial engineering. Handling the concepts implied in automation is squarely within the realm of the industrial

engineer. The design of parts and products, layout, work assignments, schedules, manufacturing sequences and so forth are problems of automation. These problems will require more industrial engineers. These exist in addition to the problems of obtaining greater utilization of technical manpower.

Other statistical and mathematical disciplines applied to the functions of industrial engineering also are playing important parts in carrying out industrial engineering into the realm of the professional branches of engineering. Further consideration of the influence and effects of automation will be provided in my later lectures.

The development and increasingly widespread use of electronic computers also has an important influence on the developing professionalism of industrial engineering. Many of the industrial engineering systems such as the production control system, inventory control system, and cost control systems require data to be stored, analysed and compared in large quantities in relatively short times. Many of the systems already in use thus are "data processing systems." The human mind is limited in scope, however, and there is an increasing need to search rapidly for records of events and for those which are scheduled,—so a time-consuming situation develops. With the advent of the electronic computer and the development of new mathematical tools and theories, we may witness the potential re-design of these traditional systems of control. This will naturally require much work, vast research, and highly intelligent and well educated industrial engineers to face the challenge of meeting the needs of these new systems. Integration and simplification of data systems are possible and are occurring.

It becomes obvious, therefore, that the definition of the industrial engineering of yesterday is not the same as the one for today—which in turn will give way to a new defini-

tion tomorrow. With a recognition of industrial engineering as now conceived, the "process of industrial engineering" may be thought of as outlined in Figure 1.

Description of the Process :

The first step of the process is "Analysis." The job of analysis is to consider various combinations of relations among men, machines and materials, money and information, in respect to time and distance, and environment, satisfaction and the energy involved. This is carried out by one or more of several analytical methods to get the facts of the relationship and to provide a basis for the synthesis of the facts into a design for an organization or controlling system. These techniques of analysis make it possible for the industrial engineer to predict the cost and performance of his designs, and give some conception of the probable error of his predictions. Then with comparison of these alternate suggestions, a recommendation is made to management for their review, and acceptance or modification, or for a new analysis.

Three methods of analysis pertinent to the analytical function of the industrial engineer may be mentioned. First there are the *traditional analytical methods*.

Traditional Analytical Methods

Process flow charts	Motion study charts
Process flow diagrams	Man-and-machine
Work measurement	charts
Fatigue study	Simo charts

Second there are engineering and statistical methods, which also have been widely used, but for shorter periods of experience in industrial engineering. These include :

Engineering and Statistical Methods

Engineering economy	Work Sampling studies
Mathematical analyses	Statistical analyses

A third series of methods of analysis include those just now taking their place in the industrial

engineering profession. These may be termed the *developing techniques of objective analysis*. These include :

Developing Techniques of Objective Analysis

Programming	Communication Information Theory
Stochastic Processes	System Simulation (Monte Carlo Method)
Servo Theory	Factor Analysis

Some of these techniques have become traditional in industrial engineering, while others are still in early experimental stages, and are in need of considerable development in application to the work of the industrial engineer. Some of these newer techniques permit the manipulation of more variables in the analysis than earlier techniques permit, thereby allowing a better insight into the interaction of these variables. It becomes possible through the newer techniques to devise mathematical or computer models, evaluations of different designs for control system can be made. Thus we can now look forward to a *theory* of inventory control, a *theory* of production control, and so forth.

The results of analysis, however, when developed, lead to synthesis and design of organizations, controlling systems and the work situation. Organization is concerned with structure, procedures and policies, and the measurement of effectiveness. Control systems include such areas as production control, and quality control, cost and budgetary control ; the work situation is concerned with plant layout, work methods, wage determination, material handling and maintenance.

Universities, Colleges and Institutes are beginning courses in linear programming, probability theories, serve mechanisms, and various aspects of operations research at increasing rates. It is anticipated that engineers should be able to make important contributions to

their companies much quicker following their graduation from academic halls than was ever before possible as a result.

The methods of prediction of cost, performance and probable errors in the estimates are receiving more attention. In order that the right decision will be made and installations of new systems may be done in the least time, more frequent and more accurate predictions are required. This considers changes in labour relations, technological change and more knowledge of what the competitor is doing.

Management decisions are constantly being made in terms of the policies which permit the most satisfactory growth for the entire enterprise. Management has the task of fitting together many functions, of which industrial engineering is only one, into the best overall solution.

The industrial engineer is usually responsible for the *installation* of his designs. It is best to install a system with a minimum of confusion so that the learning effect is minimized. Also when new models of designs are frequently installed, it becomes necessary to do so with minimum total cost of production. So the installation phase also involves reduced costs and competitive advantage. Possibly we may eventually have a theory of installation, as has been proposed for activities in industrial engineering.

In many companies the responsibility for performance of others in regard to a given design is the ultimate responsibility of the industrial engineer. If they or the system can't do what he says is possible, it becomes the industrial engineer's job to determine the source of trouble. If it is the design, he has a redesign job to do. If it is a faulty line management, supervision or interpretation, the industrial engineer must insist on correct procedures. Through *follow up* and *report*, then, corrections may be suggested. One

may then look back to the recommendation stage and repeat the process, bringing about revisions as the process is repeated.

Achieving Professionalism :

It is considerably easier to identify the characteristics of a professional industrial engineering than it is to achieve it, for there are numerous and formidable obstacles interfering with such an achievement. Some of these are external to industrial engineering and therefore are outside the control of those working in this field. Others are squarely the responsibility of industrial engineers, and are as much in need of correction as any other.

The first great obstacle is the limitation of educational facilities. This is not common to industrial engineering, but to technologists in general. In these days of almost unimaginable technological potentialities, it is important to establish relative standards if one is to know where he stands. The White Paper published in the U.K. in February 1956, on *Technical Education* provides us with the following figures on output of technologists annually:

Country	Annual output of Technologists (per million of population)
Russia	280
U.S.A.	136
Western Germany	86
Switzerland	82
France	70
Great Britain	57
Italy	39
India	10

In terms of industrial engineering specifically, in the U.S. industrial engineering graduates are approximately 5% of all engineering graduates on an undergraduate level³.

Industrial engineering graduates are approximately 8% of all engineering graduates on a Master's level.

Industrial engineering graduates are approximately 4% of all engineering graduates on a Doctor's level.

Applying these figures to Indian output of technicians, at least 200 industrial engineers should be annually produced on an undergraduate level at the present time. Recognizing that this figure is only for a going condition, it may be necessary that for starting on a sound industrial basis, a few *thousand* should be needed for several years, rather than a few *hundred*.

Another report in the U.K. suggests that increases in productivity are on a 1:1 ratio to the increase in technically trained man-power employed.

It is conceivable that professionally trained persons may develop in the field of industrial engineering without coming through academic halls, yet this is only possible to a limited degree, as one almost invariably relates professionalism to academic training and discipline.

A second obstacle to professionalism in industrial engineering relates to an associated matter, namely the degree of subjectivity which exists in several of the major techniques of industrial engineering. Professionalism usually is thought of as a characteristic of those fields of endeavour in which objective principles and procedures are traditional. If industrial engineering is to be accepted as professional it must enlarge its scope in the fields of activity where analysis and measurement are objective, and are not subject to challenge as being merely opinions or guesses, of which the individual concerned may have equally good estimates. Although the medical doctor may guess in his diagnosis of an illness, it is a brave individual

indeed who chooses to ignore the diagnosis and substitute his own prescription based on his own diagnosis. Industrial engineers must achieve the status that medical doctors enjoy—for until then they can scarcely call themselves professionals, or their work professional in character.

A similarly related aspect of professionalism is the matter of ethics. In the U.S. only a very few consulting organizations have acquired reputations of being questionable in ethics. Industrial managements guard against these questionable organizations. Inasmuch as malpractices exist in the legal and medical professions, also, however, the industrial engineering profession may observe with satisfaction that such breaches are relatively rare.

The influence of management consulting firms is also worthy of mention. It must be fundamental that consulting firms be accepted as a reputable representative of their profession. Fortunately it is only rare that they are otherwise. Constant vigil against such matters is important for the individual, for who wants to be a representative of a discredited profession?

Another aspect which bears on the professionalism of industrial engineering is the matter of nomenclature in the field—a strictly internal problem. It is typical of all professions that terminology is standardized in their fields. A word means one thing to all practitioners—and all practitioners use the same words to describe a given condition or item. The field of industrial engineering, however, is rife with unstandardized words and phrases.

One is reminded of T. S. Eliot's poem on the naming of cats, in which he says :

"The naming of cats is a difficult matter,
It isn't just one of your holiday games ;
You may think at first I'm mad as a hatter
When I tell you, a cat must have three
different names "

To one group of industrial engineers, time study and motion study are Work Study ; time study is work measurement, which includes something called analytical estimating, although how estimating can be measured is not clear ; motion study is methods study ; management is administration ; and *vice versa*, and words like organization, control, and other words have varying meanings.

Indian Obstacles to Professionalism :

Here in India you have experienced difficulties in establishing management and technical institutions. Is it industrial engineering management ? Even the name itself is not standard. Production engineering, production management, industrial management, industrial administration, general management methods engineering—and many other expressions are to a degree synonymous with industrial engineering.

It would seem that if one wishes professionalism in his field, there should be universal agreement as to what the field is, as well as in the terminology used in the field. These are just a few of the obstacles which arise in leading industrial engineering to a level of a professional activity.

Conclusion :

Industrial engineering is a relatively new branch of engineering, with stronger and closer relationships with industrial management than is typical of other engineering branches. It has had tremendous growth, and is only in its infancy. It is necessary, however, that it should not be left to drift but have guidance towards professional levels.

New techniques and philosophies are being developed in the disciplines of mathematics and other fields which are more closely related to industrial engineering than any other branch of learning. Its adoption of these new disciplines is advancing apace.

Various obstacles remain to be overtaken, however, specifically inconsistencies in nomenclature and inadequacies in the educational system. It is to the advantage of all persons who see their future in industrial engineering to attend to these matters to the extent possible, and to recommend actions to those whose influence may decide and guide these matters.

Industrial engineering is moving towards professionalism. Let us all prepare ourselves for a limitless future and unprecedented influence for those whose title is industrial engineer will be accepted with due regard.

References :

1. Census Bureau Letter—Series P. 44, No. 1, February 1954. and Census preliminary data published by Engineering Manpower Commission, March 1953.
2. Websters Unabridged Dictionary.
3. "Future Engineering Enrolments and the Problems they Pose," paper presented by R. J. Martin, University of Illinois, A. S. E. E. Meeting June 28, 1956 Ames Iowa.

(Continued opp. page)

DID YOU KNOW?

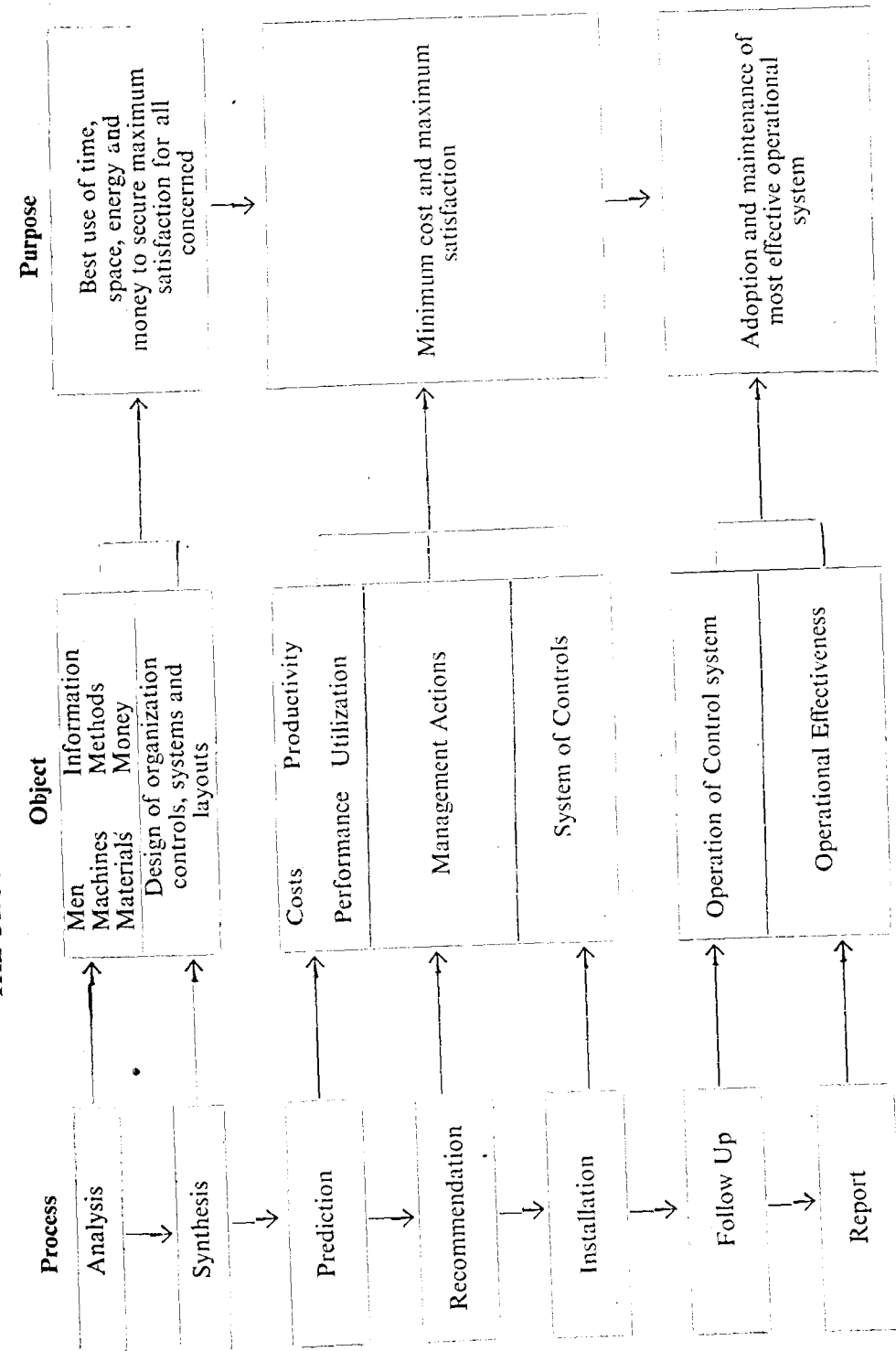


Though rockets had been known at least since 1232 A.D., the first serious scientific work with them did not begin until 1909 when U.S. physicist Robert H. Goddard commenced experiments to explore extreme altitudes. Goddard is regarded as the "father of the modern rocket".



Jean Francois Gravelet ("Blondin," 1824-1897), a Frenchman, is acclaimed the greatest tightrope walker of all-time. He made the earliest crossing of Niagara Falls on a 3-inch rope 1100 feet long and 160 feet above the Falls on June 30, 1859.

THE PROCESS OF INDUSTRIAL ENGINEERING



(The second and third lectures will appear in the October and November issues respectively—Ed.).

MARCH OF SCIENCE

U.S. IGY Scientists Map Giant "River in the Sea"

A new "river in the sea" 250 miles wide and 1,000 feet deep has been mapped by scientists participating in the U.S. International Geophysical Year (IGY) programme, the University of California Scripps Institution of Oceanography at La Jolla, California, has announced.

The new sub-surface current—which flows eastward along the Equator for at least 3,500 miles—was mapped by scientists from Scripps and the U.S. Fish and Wildlife Service's Pacific Oceanic Fishery Investigations during a recent cruise called the Dolphin Expedition.

Scientists spent 22 days measuring the current from the surface to a depth of more than 3,000 feet at the point where Longitude 140 Degrees West intersects the Equator. They located the east-flowing undercurrent only 100 feet beneath the west-flowing South Equatorial Current at the surface.

Measurements of the sub-surface current indicate that it is as strong as a thousand major rivers and as swift as the Gulf Stream.

Two research vessels—the *Horizon* of the Scripps Institution, and the *Hugh M. Smith* of the Pacific Oceanic Fishery Investigations—participated in the two-month voyage under the auspices of the National Academy of Science's IGY committee. The work is being hailed by scientists as "one of the great oceanographic discoveries of our time."

More Advanced Scientific Tools Help Weather Forecasters

Weathermen are finding more and more tools to tell them what is going on in the thousands of millions of cubic miles of air around the earth. Satellites, rockets, elec-

tronic monitors, and high-speed computers among other modern marvels, open a new age in the forecasting and understanding of weather.

Daily use of the radiosonde, a development of the 1930's, put meteorology on a solid-rock basis. This light, expendable radio transmitter is carried aloft by balloon or parachuted from a plane to record temperature, pressure, and humidity at various levels. Some 250,000 are sent up each year by the U.S. Air Force, Navy and U.S. Weather Bureau.

Rockets are already helping the weathermen. The U.S. Army recently disclosed that it is releasing metallic chaff from rockets to trace winds more than 50 miles above the earth's surface. Tracked by radar, chaff has been whisked along at some 200 miles an hour.

In addition to rockets and radar, modern electronic computers enable weathermen to realize a dream of long standing—the rapid processing of enormous quantities of weather data.

The artificial satellite is the tool of tomorrow. Weathermen expect that future satellites will be equipped with radio telemetering devices that will tell them much about unknown air currents and tides, about radiation and the earth's heat balance.

Chemical Prevents Harmful Residue in Tanks

Formation of harmful residues in fuel oil storage tanks is being prevented or reduced to harmless levels through addition of small amounts of a chemical developed by scientists of the DuPont Company of Wilmington, Delaware. In addition, the new product, called DuPont Fuel Oil Additive No. 2, has been used at higher than normal concentrations

to remove accumulated deposits without interfering with normal operations.

The residues are insoluble resins and sludge which form during storage through the reaction of unstable components with each other and with oxygen. These reaction products may be soluble in the fuel in which they are formed, but insoluble in fuel oil of a different type. Therefore, whenever distillates and catalytically cracked components, for example, are mixed and stored for an appreciable period, precipitation of sludge may occur.

On the Highway, the Lower the Slower

A preliminary study made by the Bureau of Public Roads, U.S. Department of Commerce, indicates that the small European cars take up as much of the road as standard American cars, if not more.

In the garage they occupy relatively little space. On the highway, however, the driver of a small car is handicapped by his low seat. Because he can't see far ahead, he lags behind the car in front and has to be cautious in passing. If his car has low horsepower, it is a poor hill-climber.

The same traffic analysis indicates that a woman driver of a standard car, if alone or with children, occupies 10 per cent more road space than the average and, if she's with adults, 20 per cent more.

The data on small cars and women drivers were gathered recently on Shirley Highway, in Virginia near Washington. Of 6,300 cars that passed the bureau's electronic recorders in three hours, 684 were driven by women. Two hundred and twenty of the 6,300 cars were of the small foreign variety.

The study is one of many analyses of driver behaviour made by the bureau in its efforts to find the best geometric highway designs. The road's features are examined for their effect on people.

Message-carrying Satellites

Earth satellites that can carry messages or mail in a fraction of the time now required will probably be developed within a few years, according to Dr. Wernher Von Braun, the famous United States Rocket Expert. Plans for such a project are already well advanced, he says:

It is estimated that half a dozen such satellites would be enough to handle as much information as is now sent from place to place in all the mail of the world—both civilian and governmental, Von Braun says—

He added that the development of such "communications satellites" is now possible because of new developments in electronics. The entire contents of a book could be recorded in a few seconds with an electronic tape recording system. Then the message could be carried to its destination in a satellite, which would relay it by radio as it passed overhead.

Dr. von Braun explained the working of a communications satellite as follows: As the satellite passed over New York, for example, its tape recorder would be triggered by a radio station that would receive what was then on the tape and would record, on the newly-cleared tape at high speed, messages for, say, Capetown. As the satellite passed over Capetown, the process would be repeated—taking off the messages from New York and recording new messages for some other part of the world.

Another New Computer

Scientists at the Argonne National Laboratory near Chicago rely on an electronic computer run by electricity drawn from atomic power to gain new information on the production of atomic power.

The device is a rapid digital calculator which can figure 200,000 separate additions of numbers per second. It is a network of electronic

(Continued on page 32)

PRESIDENT'S CALL TO THE PEOPLE ON INDEPENDENCE DAY

In a message to the nation on the occasion of the celebration of Independence Day, all over the country on August 15, 1958 the President of India, Dr. Rajendra Prasad, emphasised the determination of India to march forward "undeterred by the many difficulties," for the many-sided development of India, so that "our dream of establishing a Welfare State in this country is realised as soon as possible."

The following is the full text of the President's message.

"Year after year, we celebrate the anniversary of our independence, and this year too, I am sure, Indian citizens, wherever they be, would be celebrating the 11th Independence Day with the same cheer and enthusiasm. On this happy occasion I send all my countrymen, in India and in foreign lands, my greetings and best wishes.

We have been busy giving effect to our economic programme and fighting courageously the difficulties that threatened to thwart us or, at any rate, to slow down the pace of national reconstruction. There may be some who look upon the targets embodied in our Second Five-Year Plan as too ambitious. There are others who may be holding the view that the programme envisaged in the plan does not go far enough to meet the minimum requirements of our people. I would earnestly appeal to both of these sections of opinion not to be dogmatic and to accept gracefully the considered decision of the nation's accredited leaders. Our nation-building programme has a chance of succeeding only if individual differences are willingly surrendered in favour of national decisions formulated by experts and approved by Government and the Indian Parliament.

Lately there has been a tendency towards critical appraisal of Government's policies on the part of a section of our thinking people.

After a nation's development programme has crossed the initial stages, such a tendency is not only natural, but also desirable to some extent. The only thing that must be remembered is that self-criticism, howsoever constructive, must be a means to effect improvement and not an end in itself. Let every Indian citizen ponder over the situation objectively and assess national requirements as also his own responsibility for meeting them. If we proceed about this task in this spirit, there can be no doubt that we shall have achieved our objective within the stipulated time, minor differences of opinion or approach notwithstanding.

If now and then we find ourselves up against difficulties, we have also to our credit solid achievements which have inspired faith not only in the people of this country but also other nations in India's destiny. On this solemn day, a day both of rejoicings and of dedication, let us resolve that undeterred by difficulties, we shall continue to march forward for the many-sided development of India so that our dream of establishing a Welfare State in this country is realised as soon as possible.

In the world, we seem to be living from crisis to crisis, and we are just passing through one such crisis. That again is not unexpected and should be taken as a matter of course so long as the world at large does not come to realise in a practical way that nations have a right to live according to their own ways, without interfering with other's similar rights. This is what is meant by peaceful co-existence. An unreserved acceptance of that principle and its practical implementation by individuals and nations are a *sine qua non* for enduring peace. Let us hope that the goodwill and commonsense of millions of men and women the world over will enable the governments to pass over such crisis when they arise.

AMENITIES FOR PASSENGERS IN RAILWAY TRAVEL

A wide range of subjects concerning different aspects of the working of the railways were discussed at a meeting of the National Railway Users' Consultative Council, which was held in New Delhi on September 19 and 20 under the Chairmanship of the Railway Minister.

Among those present at the meeting were the two Deputy Railway Ministers, Members of Parliament, representatives of trade, commerce and agricultural interests and the Zonal Railway Consultative Committees, Members of the Railway Board and officials of some other Central Ministries.

The Council generally expressed appreciation of the progress made in the railway operational performance.

Punctuality of passenger trains and accidents on railways were two other subjects which were discussed at some length.

Other subjects which came up for discussion included catering on the railways, rules and rates of wharfage, wagon registration rules and rail concession for blind persons.

The Railway Minister told the Council that as a result of the general improvement in the operative position and the slight easing of the pressure of goods traffic, the outstanding registrations for wagons awaiting clearance had fallen substantially, both on broad gauge and metre gauge.

The Union Minister said that the easing of the traffic pressure was purely temporary. "The railways are fully conscious that heavier demands will be made on them in the near future, when the giant steel works commence operations and steadily increase their production. I am quite confident that the railways will adequately face up to the situation," he said.

The Railway Minister dealt with the operating position on the Railways and a few other issues which were to come up before the Council. He said: "During the period from January to July 1958, on the broad gauge, the total number of wagons loaded has registered an increase of 2.48 per cent compared to the total number of wagons loaded in the corresponding period of the previous year. On the metre gauge, the total number of wagons loaded during the same period in the current year showed a decline of 1.78 per cent as compared to the loadings of the previous year in the same period. This means that there has been only a small increase in loading on the broad gauge and a slight decline in loading on the metre gauge.

The Union Minister continuing said, "In respect of coal loading, however, there has been good improvement. Against a target of 3,500 broad gauge wagons per day in the West Bengal and Bihar coalfields, the average daily loading of coal during the period under review was 3,811 representing an increase of about 6.1 per cent as compared to the average loadings of 3,592 wagons in the corresponding period of the last year. During April 1958, loading of coal touched the peak level of an average of 4,018 wagons per day. There has been a general improvement in the loading of coal from the other collieries also."

The Railway Minister said, "You will also notice from the memorandum that has been circulated, that there is improvement in the number of wagons transhipped at break-of-gauge junctions and riverine points. Particularly significant is the improvement in the number of the wagons transhipped from broad gauge to metre gauge across the Ganga."

(Continued on page 24)

STEPS TO MINIMISE OCCURRENCE OF ACCIDENTS ON RAILWAYS

Better supervision and control over train services, a watch on the trend of accidents, minimising failure of equipment, improved maintenance of tracks and bridges and precautions against floods and washways are among the measures undertaken by the Government of India to minimise occurrence of accidents on railways, according to a review of railway accidents during the past 20 years issued by the Ministry of Railways some time ago.

The review said that the main reason for the incidence of accidents was the failure of human element caused more by mental aberration, laxity, indifference and indiscipline amongst railway staff, than lack of knowledge of rules and instructions laid down for ensuring safe working. The basic approach to the problem therefore, the review said, had to be both "punitive and psychological."

It said that research cells had been set up on each railway for continuous analysis of various categories of accidents, to determine the factors more commonly responsible for accidents, so that appropriate remedial action could be planned.

Safety organisations had also started functioning, not only at railway headquarters but at each railway district, division and workshop. They were responsible for intensive outdoor inspection and for action necessary to remedy any shortcoming that might be noticed.

It gives analyses of the number and nature of accidents, the number of casualties, a breakdown of accidents according to causes and comparison of these figures with corresponding statistics on the British and American railways.

According to the review the post-Independence peak figure of 24,120 accidents of all kinds was recorded in 1948-49 and this figure has steadily come down to 9,011 accidents of all kinds in 1957-58. This figure included 17 serious accidents which were enquired into by the Government Inspectors of Railways.

The review says, however, that the term "accidents" is used in a comprehensive sense and the figure of 9,011 accidents during 1957-58 included 1,661 cases of trains running over cattle (18.4 per cent), 4,825 cases of failure of engines, rolling-stock and permanent-way (53.5 per cent) and various other accidents like collisions, derailments, fires in trains and stations, accidents at level-crossings etc.

The review points out that the incidence of accidents on Railways bears a distinct relationship to the total volume of traffic handled. In the case of passenger trains, for every 100 million train miles operated by the Indian railways, there were 31 collisions and 189 derailments during 1947-48, the peak year after Independence. Corresponding figures of 1956-57 were 11 collisions and 189 derailments. For 1957-58 the figures were 14 collisions and 92 derailments.

In regard to casualties also, the peak year was 1947-48 when there were 102 casualties for every 100 million passengers carried. The corresponding figure was 21 in 1955-56, 45 in 1956-57 and 42 in 1957-58.

(Continued from page 23)

"Mostly as a result of the general improvement in the operating position and the slight easing of the pressure of traffic, the outstanding registrations in terms of wagon loads awaiting clearance on the broad gauge have been reduced to 26,026 at the end of August 1958 compared to 57,145 at the end of January 1958 and 44,306 at the end of August 1957. On the metre gauge also, the position has improved and the outstanding registrations at the end of August 1958 were only 21,101 compared to about 31,000 at the end of January 1958 and 22,040 at the end of August 1957.

"SELF-SHARPENING GRINDING WHEELS"

(Translation of the article published in the periodical "Technische Rundschau" Bern, Nr. 40 of the 7th December, 1951)

BY

SHRI T. V. SRINIVAS MURTHY,

(Precision Tool Grinder)

The application of grinding tools has added considerable impetus to modern developments in production engineering. Nowadays it would indeed be difficult to find a manufacturing plant which does not use grinding wheels. These abrasive cutting tools, which are fundamentally similar to milling cutters with an infinitely large number of small and irregularly-shaped cutting edges, were developed during the first half of the 20th century and are now of vital importance in metal cutting operations all the more since it is quite impossible to visualize how the accurate manufacture of other cutting tools such as lathe and planer tools, twist drills and taps, milling cutters and broaches, cutter blades and punching tools, etc., could be carried on without their aid.

In spite of their ever-growing importance, grinding wheels are often a problem in many workshops even at the present day, for undoubtedly the use of unsuitable grinding tools can have many unwelcome consequences which for the most part are due to the incorrect make-up of the particular wheel employed.

The make-up of a grinding wheel is given by its identification marking which furnishes information regarding abrasive, grain size, bond, structure and grade or hardness. The most important factor affecting the grinding action is hardness (followed by grain size). Whilst the abrasive agent and the bond must be regarded as unalterable for any given type of grinding duty, it is possible to influence the

action of the wheel within wide limits by modifying the hardness (and also the grain size). On the shop floor the complaints usually heard are that the wheels used are either too hard or too soft—the terms 'hard' and 'soft' being employed loosely to define not the abrasive itself but the hardness of the bonding agent which alone is responsible for holding the abrasive grains in the wheel or allowing them to break out. Therefore, in addition to classification on the basis of the factors mentioned above, it is also possible to assign a hardness rating to grinding wheels by virtue of their behaviour during grinding, and to divide them into hard and soft wheels.

If the wheel is too hard it will very quickly lose its cutting power due to continual dulling of the abrasive grains which therefore cease to be effective and, instead of cutting, "glaze-up"—to use the technical expression—and block the porous structure of the wheel. At this stage the noise produced by the grinding action changes from a slight hissing sound to a deeper, muffled tone and the brightly polished appearance of the ground surface indicates a burnishing action. Consequently, wheels which are too hard must be frequently dressed, sometimes after only a few minutes work, by using a dressing tool or diamond; in other words constant re-sharpening is necessary and this in turn imposes additional wear on the wheel. This has even led to the design and introduction of special automatic wheel dressing attachments. The dressing process, however, destroys upto

90% of the wheel unnecessarily and artificially so that only about 10% of the capacity of the wheel can be usefully employed.

Approximately 90% of all standard type grinding wheels are too hard and therefore suffer from the defect of continual dulling. An unduly soft wheel, although admittedly free cutting, tends to wear too quickly and causes rapid dulling of the active abrasive particles to a greater or lesser extent with the result that the latter fall out at a rate which rises with increasing softness of the wheel. For a long time this premature breaking out of the abrasive particles was known erroneously as the "self-sharpening effect"—the term being justified by arguing that the process gave continually rise to fresh, sharp or pointed abrasive grains in the wheel and thus maintained its cutting power. Against this, however, it may be argued that break-out of the abrasive grains means that the wheel structure is destroyed prematurely and that true self-sharpening action is out of the question. Soft wheels wear down far too rapidly and become out-of-round as well. This in turn involves constant re-dressing so that economical grinding with oversoft wheels is an impossibility.

This useless and unprofitable reduction of the wheel is not merely confined to hard wheels which are worn down by repeated dressing, but affects soft wheels as well due to the breaking out of the abrasive grains and the need for constant dressing. The net result either way is an excessive rate of wheel wastage. In both cases the performance of the wheels is far too poor and bears no relation to the substantial outgoings on material, power and labour. Most important of all, however, the constant dulling of the grains and premature break-out are the primary cause of all the troubles and expensive failures due to the heating effects or profile errors introduced while grinding.

Damage resulting from heating action includes grinding cracks, which appear as fine surface checks, as well as local softening due to the

heat generated by grinding which draws the temper of work that has been hardened; this condition can be identified by the fact that a new file "bites" when drawn across the damaged surface and that a three-percent solution of nitric acid in alcohol quickly etches the spot to a dark colour. Lattice distortion is a third harmful factor affecting ground work. Out-of-roundness, taper, facetting, unevenness, crowning and other dimensional inaccuracies in the work result from grinding with unsuitable wheels. Although grinding, generally speaking, is only called upon to remove small amounts of stock, it remains nevertheless a time-wasting and costly process due to the high reject rate caused by faulty work. An improvement in this uneconomical state of affairs can only be made possible by the introduction of grinding wheel which is self-sharpening in the true sense.

As early as 1907 the problem of self-sharpening was studied by Professor Schlesinger in the course of his first fundamental grinding experiments. He recorded his observations on self-sharpening in approximately the following manner.

"If the grinding wheel has been correctly selected for the work concerned, and if both wheel and work are run at the right speed, then the wheel—and this is what makes it so remarkable and unique as a cutting tool—will stay sharp and round. It will retain its open structure, that is to say the pores of the wheel will not become blocked by metal particles which load the grinding face and quickly reduce the grinding action to zero. Being a rotary cutting tool a grinding wheel must obviously become dull when its periphery turns into a smooth cylinder completely devoid of protruding cutting edges. The dullness of a wheel is rendered visible by the decline in the spark picture whilst at the same time the light yellow colour of the sparks changes to a steadily darkening red. A dull wheel, however, can be detected even more readily by the ear. A sharp wheel cuts with a characteristic hissing noise in which one

can positively hear a true cutting action; a wrongly selected wheel, on the other hand, very soon gives out a booming sound which quickly changes to a low rumbling. The work takes on a roughened surface and becomes warm; runout finally occurs and forces the operator to stop grinding. If, while using a sharp grinding wheel, a watch is kept on the ammeter indicating the current consumption during a grinding pass, it will be found that the increase over idle-running conditions is barely perceptible."

From the foregoing it is clear that the Schlesinger even at that time was a very close observer of grinding conditions and was very near to appreciating some of the advantages of the self-sharpening property. However, he did not concern himself with the nature of self-sharpening action, and still less with the requirements to be satisfied. For thirty years no one considered it possible that effective self-sharpening action, could really be maintained indefinitely during a grinding operation.

The self-sharpening problem

In Germany Dr. Ing. J. Dorfner was the first to recognize the problem of self-sharpening. At first his article on "Grinding Wheels" (*Maschinenbau/Der Betrieb*, Vol. 20, 1941, No. 11 pp. 469 to 471) failed to receive serious attention even from those who were leading experts, however, they were soon obliged to admit their mistake. Dorfner had studied the relationship of events in the grinding cycle and the inter-action between the wheel and the forces applied, and had discovered the essential principle of self-sharpening action which depends on the alternate dulling and splitting-off on the minutest scale and due to the alternating play of the grinding forces of the abrasive grains in contact with the work. After much hard work based on a correct appreciation of the events responsible for self-sharpening action he succeeded in establishing the design requirements for making self-sharpening grinding

wheels. The first wheels of this type were manufactured in 1936. The controlled make-up of these wheels affords the practical possibility of the self-sharpening action which is brought into effect by observance of the correct grinding conditions. This feature enables optimum cutting power to be maintained consistently and permits a substantial improvement in output, both quantitatively and qualitatively. In addition it is now possible to find the perfect grinding wheel for any type of work since the wheel must necessarily have the right hardness and composition. The less frequently a grinding wheel needs dressing or roughening, the more nearly it approaches the ideal of the self-sharpening wheel.

At the end of 1939 systematic grinding tests were started at the Charlottenburg Technical University in order to clarify the rules governing conditions for the employment of self-sharpening grinding wheels. This work showed that grinding practice still offers much new territory for exploration if starting out from and building on the assumption of a self-sharpening wheel—the aim is to arrive at performance figures for self-sharpening grinding wheels on much the same lines as the work carried out on lathe tool life. In fact it has already proved possible for certain materials to provide precise operating data observance of which ensures proper self-sharpening action and enables optimum grinding performance to be achieved—indeed a notable advance in grinding practice.

Naturally, the performance of any cutting tool depends not only on its efficiency and suitability for the job, but also—and to a still greater extent on the way in which it is used. This is particularly true of grinding tools which are affected by many factors and which, as regards selection and handling, are still imperfectly understood in many workshops. Practical demonstrations with self-sharpening grinding wheels have proved their ability in roughing

and plunge-cut operations on structural and tool steels, bronze and plastic materials to remove up to 2500/u/min. in diameter whilst maintaining constant cutting power hour after hour. In fine grinding operations the wheels rapidly produced surfaces with a roughness of only $H = 0.3/u^*$ and accurate to shape and size to within $1-0.5/u$ so that in most cases it was possible to dispense with a third operation involving lapping or superfinishing.

*According to Grodzinski: Quality of surface finish h_m $1/6 H =$ Many leading firms have tried out self-sharpening wheels to an increasing extent under conditions appropriate to their rational employment, using them on existing grinders engaged on production runs and operated in some cases only by semi-skilled labour, despite some initial scepticism these firms were finally convinced of the technical and economic merits of the new wheels, namely

- (a) grinder output doubled and sometimes more than doubled;
- (b) wheel consumption cut to half or less;
- (c) no rejects of any kind, and last but not least
- (d) quality of surface finish improved.

On the economic side the gain represented by the new wheels is a vast number of machine-hours, a great deal of grinder capacity and tons of grinding material—and all this without any additional investment being needed. The following extract from a table compiled by a well-known industrial firm shows how it was possible, by using self-sharpening wheels, to make a cut of up to two-thirds in the centreless grinding capacity originally required.

As further practical proof of performance, Table I gives details of the time saved on production grinding operations when using self-sharpening wheels.

Item	Material	Time saved (Max., (Per-cent))
Plug Gags	Steel, hardened or chromed	94
Gasoline pump plungers.	Steel, hardened	85
Mechanical lubricator plungers.	Steel, hardened	85
"Torpedo" pump plungers.	Phosphor bronze, V2A steel 13% chrome (Remanit-Krupp) 80	90
Valve slides	Steel, hardened	90
Electrical rotors	Electrical sheet, annealed.	67
Clamping cones	Poldics, hardened	50
Pole wheels	Koerzit	85
Camshafts	Steel, hardened through and case hardened	80
Cone pulleys	10% chrome steel, Goliath-special	80
Crankshafts	Steel, nitrided	67
Valve heads and seats.	RUS, hardened	70
Gears	Steel, hardened	67
Pistons and piston pins.	Steel, nitrided	65

NOTE.—So far it has been usual to fine-turn phosphor bronze pump plungers with polished diamonds and then lap them. Self-sharpening wheels also give superior results—both from the economic and technical viewpoint—when used for fine grinding bronzes; this is due to the fact that the smaller amount of heat generated by grinding enables optimum accuracy of shape and dimensions to be realised.

With self-sharpening wheels no difficulty is experienced even when carrying out extra-fine grinding operations on cast iron or any type of carbide metal.

Number of passes	
Formerly	Now
12	4
4	2
3	2
5	2

It has been found repeatedly that fine-ground surfaces produced by self-sharpening wheels are superior in quality to those produced by lapping or superfinishing operations. A typical example is the surface on the main-shaft of a gasoline pump. This shaft was rough-ground, then finish-ground and finally lapped by the markets. Since the shaft was found to have a runout of $2.5/u$, it was fine-ground with a specially selected self-sharpening wheel with the object of reducing the out-of-round error to $1/u$ shows the interested transition from the lapped to the ground surface, the latter revealing a striking improvement in the uniformity and quality of the finish.

The vitrified-bond, self-sharpening grinding wheels are manufactured by a moulding process and are available in comparatively few grain sizes and grades. The small number of wheel varieties permits series production methods to be used in their manufacture and simplifies the stores problem for manufacturer and user alike. In comparison with conventional moulded wheels a saving of 25–30% in abrasive material, such as electro-corundum (Al_2O_3) and silicon carbide (SiC), can be effected. In the field of grinding practice the outstanding performance

of self-sharpening wheel is comparable in importance to the earlier discoveries of high-speed steel and carbide metals as applied to lathe-work, drilling, milling, sawing etc. Due to their "sound" self-sharpening properties and to the extra output thereby obtained, the wheels discussed here are easier and more economical to use than wheels having a random breakdown of the abrasive particles.

Self-sharpening

Dorfner

Controller-structure grinding wheels

Due to their special make-up, Dorfner Controller Structure Grinding Wheels (DGS) are largely self-sharpening and therefore satisfy the principal requirements for economical grinding.

1. Free cutting and cool working.
2. Reduction of grinding time due to improved grinding action combined with long wheel life.
3. Improved surface finish and better cutting edges on tools.
4. Extreme accuracy regarding size and shape of work.
5. Saving on grinding wheels and dressing diamonds.
5. Elimination of grinding rejects.

Stating our view

The life of a grinding wheel should be as long as possible. The "right" wheel should therefore give free cutting action for the longest possible time without requiring constant re-dressing with a diamond or other tool. The wheel should produce work of consistent quality, and the interval between dressing should be as long as possible to minimize wheel wear.

INSPECTION AND MAINTENANCE OF ALTERNATING CURRENT MOTORS

[This article is digested from the August 1957 issue of 'Maintenance' and reprinted with the kind permission of the United States Technical Co-operation Mission to India—CEd.])

The importance of regular inspection and maintenance of alternating current motors cannot be too strongly emphasised. For this reason, an inspection procedure should be established and a record kept of each machine.

The first step is to set up a record system employing a form listing all items to be inspected and the frequency of inspection of each. Each item can be checked off by the maintenance man as he does the job.

Obviously a large plant will need a more elaborate record system than a small organization. Therefore it is necessary for each maintenance supervisor to work out his own plan. However, when a record is made out for any particular motor, it is well to list as much data as possible, such as type, rating, manufacturer, when purchased, purchase order number, and all information from nameplate. When the inspection is made, the condition of the equipment can be noted, together with the date, repairs made, and their cost. A check chart can be printed on front or back of a record sheet, and the various inspection periods can be indicated for the particular machine in question.

When the system is established, an inventory of spare parts should be planned. In the case of some units, particularly the larger ones, the amount that can profitably be invested in inventory will depend on how important the machine is. If a failure would result in extensive downtime and an appreciable loss in production, it might be desirable to have a whole new motor available. If, however, the unit is relatively unimportant, or if the work can be shifted elsewhere, the inventory of spare parts can be minor.

There are many conditions that augur trouble which the maintenance man can readily see, hear, or feel. One can note if a motor is subject to excessive dust, if its location prevents a free circulation of air around it, if it is subject to water drip, or if it is near a machine where a hot air discharge makes the ambient temperature too high for continued satisfactory operation. Clicking, knocking, chatter or hum are readily discernible. Vibration can be felt with the hand.

Preventive maintenance might well start with dust and dirt. A motor should be kept clean. Use a vacuum cleaner or a wiper to remove the outside accumulation. Air pressures from 40 to 60 pounds per square inch can be used to blow dust from windings and insulation. If dirt is solid in the ventilating apertures, and compressed air won't remove it, it may be necessary to take the machine apart for cleaning.

Do not overlook cleaning such things as brush holders, slip rings, and slip ring insulation. Examine the insulation to see if it is oil-soaked or shows signs of deterioration.

If there are indications that moisture has penetrated the motor, drying procedures should be followed and the source of moisture eliminated.

A motor needs normal ventilation. Cartons or work in process should not be piled in such a way as to prevent air from circulating freely around the unit. The motor operating temperature should not exceed the maker's recommendation.

Proper lubrication is a necessity. Many motors are equipped with anti-friction bearings,

grease-packed at the factory, and have a regreasing period that may vary from 8 to 9 months to several years. Severe service will reduce the normal life expectancy of the lubricant. Manufacturers' regreasing are frequently specified in operating hours and their recommendations should be followed carefully. Excess grease will cause bearings to run hot and it may find its way into the windings. Do not regrease while the motor is running.

On sleeve bearings, follow manufacturers' instructions. Do not add oil while the motor is running, as the gauge gives an erroneous level and too much oil may be added. Stray oil may enter the motor where it acts as a dust catcher and also adversely affects insulation, collector rings, and brushes.

If the motor has slip rings, the brushes should make full contact with the rings and be set so that they do not overlap the ring edges. They should be sandpapered to carefully fit the curve of the ring. Oil-soaked brushes should be replaced.

Bearings should be checked for overheating, which results from such misalignment, too much tension on belt or chain drive, excessive end-thrust, sticking oil ring, insufficient lubricant, too much grease (in the case of ball or roller bearings), or uneven air gap.

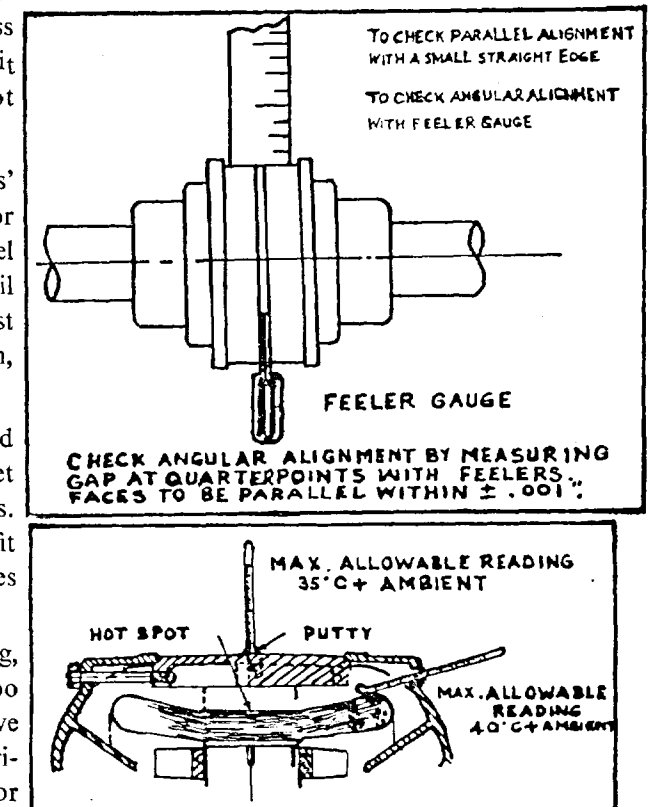
On a sleeve bearing, a thermometer can be placed in the oil well to obtain a reliable temperature reading.

Check the air gap with a feeler gauge. Check at both ends, and at top and bottom. Unequal measurements probably indicate a worn sleeve bearing. Under no condition should bearings be allowed to wear so that the rotor rubs the stator.

A change in air gap is unusual in ball or roller bearing motors unless the bearing fails.

Check wiring and the conduit box. See that all connections are tight. Check all fuses, particularly on polyphase motors.

Foundation and motor bolts should be tightened if necessary. Loose bolts lead to misalignment and attendant troubles. If there is vibration, the alignment should be given special attention. Check alignment of coupling.



Check tension on belt or chain drive, and see that no grease is on pulley surfaces.

To determine if a motor is running hotter than the permissible temperature limits, use one or more thermometers. Permissible temperature rise is usually indicated on the nameplate. The drawing above illustrates how to check temperature. A thermometer is inserted in the head bolt or eye bolt and sealed with putty.

On polyphase motors check for unbalanced voltage which results in overheating.

In addition to the routine checks indicated above, there comes a time when any motor should have a complete overhaul. This period

can be determined by the maintenance engineer in accordance with the degree of service.

After each inspection, the spare parts inventory should be checked. If the findings indicate the probably early need for replacement parts not in stock, such parts should be ordered and held in readiness.

Since various types of motors often require that specific inspection and maintenance procedures be followed, it is important to contact the manufacturer of each separate make and type of motor, giving complete nameplate data and other pertinent information, and request instruction, servicing and replacement

parts bulletins covering these machines. Availability of these publications should then be noted in the individual motor records.

(Continued from page 21)

tubes, magnetic cores, wires and a large number of other parts big enough to fill an ordinary living room. It operates on an usual house current of 115 volts.

The instrument was fashioned to compile technological computations and mathematical deductions of research information. Argonne scientists worked three years to put the machine together.



A characteristic pose of our physical culturist Shri J. Kothandaraman, Basic grinder, B shop with a python round his neck

INDEPENDENCE DAY CELEBRATIONS IN THE INTEGRAL COACH FACTORY

As in the previous years, Independence Day was celebrated on August 15, 1958 in the Integral Coach Factory.

In the morning, the Chief Administrative Officer, Shri K. Swarup, reviewed a parade by the Railway Protection Force and hoisted the National Flag.

A short speech, addressing the large number of staff that had gathered on the occasion, was delivered by Shri K. Swarup. He thanked the workers for the unstinted co-operation and assistance given by them. Since the attainment of Independence, our leaders and our people had been straining every nerve to develop our country in the economic sphere. The Independence that the country had attained would have no meaning, if it was not utilised for the economic uplift of the millions, a vast number of whom were below subsistence level, ill-clad, with no education, no health benefits and no shelter. The whole national energy had been marshalled under the First and Second Five-Year Plans to improve the lot of the common man. In spite of the significant and impressive progress that we had made in the last eleven years, there was still a long way to go if we were to compare ourselves favourably with the advanced countries of the West. We had a great responsibility and our generation had to work hard to improve the position for the benefit of our children and grandchildren.

Shri Swarup continued that Independence Day was also a day of reckoning, when it was usual to review past performances and to take further pledges for the ensuing year. The workers in the Integral Coach Factory had done a splendid job during the past year by not only passing the target that was set for them but also by bringing the target date for peak production two years ahead of schedule.

The Chief Administrative Officer observed that the Interim Furnishing arrangements had

overcome the initial teething difficulties and were now well on their way to turn out much more than what could be normally expected of such a project.

The Technical Training School of the factory had now attained a position of distinction in the country.

The young designers in the factory had dedicated themselves to their task and had produced a design of a TLR in light-weight construction. Shortly the design for the De-Luxe bogies would be prepared. A second shift was being planned to double the production in the factory.

Concluding his speech, the Chief Administrative Officer exhorted the workers to rise equal to the demands placed on them and acquit themselves in a most fitting manner as was expected of them. The Chief Administrative Officer felt that it was his proud privilege and pleasant duty to pay a tribute to the cordial and efficient co-operation of the Swiss Engineers and Technicians most of whom had gone away, leaving the work to be continued by ourselves. The Chief Administrative Officer requested the workers to remember the high Indian traditions and the team spirit that the workers had built for themselves.

To mark the occasion, sweets were distributed to children of the workers and the staff at the Integral Coach Factory Institute.

As part of the celebrations, sports competitions were conducted for the I.C.F. employees and their children. There was also a mass physical training demonstration by the I.C.F. Protection Force Personnel. Prizes were distributed by Mrs. Swarup to the successful competitors. A Tamil drama entitled "Amara, Vazhvu" was staged on the evening at the I.C.F. Institute Open Air Theatre by the Ayana-varam Amateurs. A large gathering witnessed the drama. The Administrative Office building and the Institute were illuminated.

I.C.F. COLONY AIDED ELEMENTARY SCHOOL ANNUAL DAY CELEBRATIONS

The Fourth Annual Day Celebrations of the I.C.F. Colony Aided Elementary School was held on 30-7-58 under the presidentship of Shri R. Kunchithapadam, I.A.S., Collector of Chingleput. As usual the function was held in the Auditorium of the I.C.F. Institute.

The Manager and Correspondent of the School, Shri S. G. Iyer, in submitting the Annual Report of the School for the year 1957-58, stated that the strength of the school had risen from 181 to 217 and requested the I.C.F. authorities for the construction of a proper school building, since the present school was already getting congested. The following extract from the inspection register of the school was read out :

"A good collection of Album (photos) has been made. National festivals are celebrated in an appreciable manner. Junior Red Cross Society is functioning. A First Aid Box with medicines is equipped. Excursions to local places are conducted for educational value. Garden work is very satisfactory. The experienced Headmaster with his enthusiastic assistants is scheming in an appreciable manner to promote the tone of the School day by day. The general condition of the School is satisfactory on the whole."

The Manager specially touched upon the various functions in which the children participated and the various important personages whom the children had occasion to receive and welcome in their midst. Mention was also made of the gift of Rs. 100 to the children of the School by His Excellency the Governor of Madras for distributing sweets.

Shri Swarup, C.A.O.(R) who was unfortunately not well, sent his regrets for not being able to attend. Shri Bhattacharyya who deputised for him spoke appreciatively of the all-round improvements noticed in the various aspects of the activities of the school and also thanked Shri Kunchithapadam for the interest he was taking in the cause of education and for having consented to preside on the occasion.

After distributing prizes to the winning children, Shri Kunchithapadam gave a very impressive talk on revolutionary methods of imparting education adopted in foreign countries and hoped that such practical and basic methods will come into vogue in this country also very soon. His references to the project method of instruction was highly interesting and thought-provoking.

By this time, the hall had got thronged to full capacity, in anticipation of the variety entertainment programme of the evening. There was a magic entertainment by Prof. Chinnah of Messrs. Veecumsee Jewellers Ltd. The items displayed by him were really superb and evoked repeated applause from the members of the audience. This was followed by a comical entertainment (Vikatam) by the celebrated pair of entertainers Sarvashri Santhanam and Chandru. They kept the whole hall roaring with laughter for the one hour they held the stage.

With the singing of the Jana Gana Mana, the function came to a close and the audience, when dispersing, did so, with a feeling of having spent a very interesting, delightful and entertaining evening.

AT THE BUS STOP

BY

S. K. RAMANATHAN

It has become more or less a regular feature that on my way back home I should wait for the bus for a long time and finally when the bus arrives to be elbowed and pushed out or squeezed at the doorsteps. The agony is more so when I just miss a bus and wait from the beginning to be treated thus by those who dash just in time. But there is no help for it except to just put on grin and massage the battered limbs. Also until the next bus arrives to spend the time by cursing the transport.

It was a rainy day. In spite of my holding the umbrella in defence, the bus I missed somehow managed to splash a good quantity of muddy water on me. The only thing I could do was to add one or two more hot curses to the usual ones. Then I felt something rubbing and sniffing my ankle. I temporarily stopped cursing the bus and looked down. It was a pup yelping and sniffing. Finding me lookign at it, it increased the frequency of waving its tiny tail and started circling around me. Finding no response, it again started sniffing here and there. It was a beautiful pup, with dark spots on a pure white background. Perhaps it was trying to find something to eat.

One after another people started collecting at the stop. The more the number of people came up there more I was panicked. They were my prospective enemies at the bus stops. Mercilessly they push and squeeze. I felt relieved occasionally when people got into buses of different routes. The pup all the while was running hither and thither. Now and then it stopped before someone and whined looking at him. The person looked at it and then turned away.

The pup then approached the next person. Occasionally it stopped begging and trying to trace some scent and sniff at pebbles. A frog came by jumping. That was his day. In all majesty it splashed from pool to pool and landed near the pup. Taken aback, the pup stepped backward and craned its neck to smell the intruder. Will he be any good? Unmindful of this the frog kept on its leaps. The pup ran after it for some time and returned disappointed. What else to do? He sat on his haunches and vigorously scratched the back of ears and shook his body. Then it started yelping again.

All the while I was absorbed in the pup and was unconscious of things happening around. The next bus took exceptions for cursing the previous ones and passed on without stopping, of course splashing two bucketfuls this time. I had nothing to feel sorry because not only myself but none else got into the bus. When I was thus congratulating myself, who should come and bang me at the back but my old classmate in the elementary school.

"Hey, idiot! how does it happen that you are here, eh?"

"You can have the liberty to bang my back or to know how I am here but definitely not to call me an idiot!"

"Ha, Ha!" he laughed and shouted. "Don't you remember what you were in the school? Don't you remember what the teacher used to call you?....."

"I say.....there is no meaning in it. What do you think, you were in the school? Don't you remember that you were hung upside down and beaten by your father for eating raw brinjals".....I retorted.

"Okay, okay, that's alright. How are you? How is your father? eh?" He started smoothening out. "How is that fellow, do you remember, the one with the tuft?"

"He no longer has the tuft. He has gone to Germany....." Thus the talk continued.

By this time the pup had gone round once and was sniffing at my friend. He jerked round and instantly started waving his hands. Before he had raised his hand, the pup crouched low and screamed as if the heavens had fallen squarely on its head. The people around, all of a sudden became extremely sympathetic and very strongly disapproved my friend's action.

Suddenly everyone rivetted their gaze in the same direction and started prophesying the number of the oncoming bus.

"But there is no bus," I said.

"Don't you hear any sound? It looks like our bus only," one said.

"Why, I can even hear the rattling sound. Certainly it is our bus," another said.

Suddenly a lorry emerged from a bend farther off. The whole crowd unanimously said, "tcha" and proceeded with their talk. Instantly a bus came out and everybody were overjoyed. No more of friendship or kinship. The whole

groups scattered and everyone rushed up to take vantage positions. The usual practice is to assess the approximate position of the doorway from the speed and direction of the bus. This requires experience and instinct and of course, luck. If the bus stops with the entrance right before you, then it is no longer your business to get in. Others will do it for you. Simply you will be lifted off your feet and thrown inside. The only thing you should do is to instantly jump up and occupy the nearest seat, that is if you want to retain your shape. Luck just brushed past one, I should say, when the entraneer just passed me and stopped two feet hence. Instantly an elbow flew and knocked me off and before I could commence the curses I was out of the picture. I looked around but could not find my friend anywhere. Looking up I found him elbowing everybody at the back and challenging those in the front. The pup somehow escaped in the melee and was making friends with the tyres of the bus. The conductor blew the whistle and my friend waved to me. The bus started and the pup screamed aloud. I and a handful of those at the stop sympathised but that could not help the pup. It had screamed its last. Its blood stained the road and drained in a nearby pool. I bid goodbye to the bus and the pup and started walking along.

VISITORS TO THE FACTORY

The view, that "the Integral Coach Factory is another example of the great strides which India is making towards achievement of self-sufficiency in the Public Utility Service," was expressed by Mr. Kamaluddin Mohammed, Minister for Agriculture, Trinidad, who visited the factory on the 1st August 1958 accompanied by Mr. D. C. Granado, Minister for Labour and Social Services. Mr. Mohammed went on to observe that "the workmanship, training programme and general provision of amenities for staff and workers were remarkably impressive." Mr. Granado offered the highest commendations to the Government for this wonderful achievement.

The Ministers from Trinidad were received by Shri K. Swarup, Chief Administrative Officer, and were taken round the Workshops and the Technical Training School.

The Hon'ble Shri B. R. Bhagat, Union Dy. Finance Minister paid a visit to the Integral Coach Factory on the morning of the 4th August, 1958. He was received by Shri K. Swarup, C.A.O.(R) and was taken round the Workshops, the Technical Training School and the site of the Furnishing Annexe. He evinced keen interest in the working of the factory and observed that he was quite impressed with the work going on in the factory and that it

was indeed a key factory being run efficiently and imaginatively.

In the afternoon a Study Group of the Estimates Committee of the Lok Sabha visited the Factory. They were received and taken round the Workshops and the Technical Training School.

On the same day, Mr. William R. Pabst, a Statistical Quality Control Expert from the United States who is working in the Quality Control Unit, Southern Regional Centre, Bangalore during August and September, 1958 visited the factory. He was invited to visit this Factory with a view to discuss matters allied with quality control.

Shri V. R. Narla, M.P. visited the Factory on the 18th August, 1958.

Seven members of the Ship Repair Committee, appointed by the Government of India visited the Factory on the 19th August, 1958.

Members of the Unions of Railwaymen in the country led by Sri P. Subbaramaiah, General Secretary of the National Federation of Indian Railwaymen, visited the Factory on the 20th August, 1958. At the conclusion of the visit Shri Subbaramaiah observed that the progress of the Factory was impressive and that one could really see in this Factory what Indian labour was really capable of.

Brain teasers

1. Three tired travellers came to a hotel and each ordered a dish of rice, but as was the custom in that country the server brought one plate of rice with 3 spoons. Unfortunately by the time the dish was brought the tired travellers had all fallen asleep. The server left the dish on the table without disturbing them. The first of the travellers that woke up ate a third of the dish, left the balance for his friends and went back to sleep. When the next one woke up he, not realising that one of his friends had already had his share, ate a third of the dish left and went back to sleep. The third one also did the same on waking up. When the server came to clean the table he found some rice still left and as was customary made a deduction of 80 naye paise in the bill. What was the total bill?

2. Assuming the earth to be a perfect sphere of 40,000 kilometres in circumference and that it is possible to put up a fence right round the earth in such a way that the length of wire used is 30 metres in excess of the earth's circumference, would it be possible for a dog to pass under the wire or would it be necessary for it to jump over the same if it has to go from one side of the fence to the other.

3. Kittu being too indifferent with mathematics was provided with an incentive by his father. The arrangement was to pay Kittu eight naye paise for every correctly solved problem and fine five naye paise for each incorrect solution. After solving 26 problems they were quits. How many problems did Kittu solve correctly?

4. In the following problem each letter represents a number.

$$\begin{array}{r} A B C \\ D E \\ \hline F E C \\ D E C \\ \hline H G B C \end{array}$$

What do the letters stand for?

5. Find the smallest number ending in 4 which is doubled when the final digit is transposed to the first position.

6. Five friends are all manufacturers of cycles. Each has an only son, who owns a cycle made by one of his father's friends, and whose occupation is indicated by one of the five names, other than his own.

Of the sons the brewer owns a brewer cycle and is the namesake of young Brewer's occupation and cycle. The carpenter's name is not Turner but he owns a Farmer Cycle.

What is the dyer's name?

Solutions to last month's teasers

1. Arun loses approximately Rs. 2.88 nP. (correctly 2.8816)
2. The speeds of trams and that of the pedestrian are respectively 10 and 4 miles per hour.
3. Ace, 3 King, 7, Queen, 4, Jack, 6, 10, 2, 9, 5, 8.
4. Logu wins 10-8.
5. DeLab was the husband of George's second wife in the party.
6. Railcoach.

Wit and Whistle

1. The newly recruited Bank Manager wanted to provide an incentive for the staff to bring out any novel idea they may have in their minds. So he hung a number of boards painted on them. "DO IT NOW, BEFORE OTHERS CAN DO IT." When he was asked by one of his pals regarding the effect of it, he was very sad. He said, "Oh! Please don't ask me about it. The very next day, my cashier slipped off with Rs. 3,000.

2. He was a leading journalist and also a little eccentric. Once he was invited by a journalist association for a party along with many of his colleagues. The treatment given to him and his colleagues being very lavish and grand, he was very reluctant to go back even when his friends were about to leave. He said that he would like to stay in the same hotel for some more time and that he would not accompany them. So he continued to stay there. But he was shocked to learn when he was about to leave the hotel that he had to pay the balance of the charges incurred due to his overstay. He said, "I have no cash."

"Does not matter sir, you can give us a cheque," said the cashier.

"I have no cheque either."

He was given a blank cheque and he filled in the amount and signed it promptly.

"I am sorry sir," said the cashier, "you have forgotten to fill in the name of the Bank."

"Oh! yes, yes!" said he, "why don't you tell me the name of some good bank too?"

3. The fresh law graduate was nervous, as it was his first appearance in the court. He waited in a bride-like manner for his name to be called out and at last it was called out. He put his overcoat and hat on the bench and proceeded near the table.

The judge asked him sternly, "Is it the first time that you are appearing in this court?"

The lawyer lost his nerves. He said with a very apologetic face (and yet questionable) "Yes, sir."

"Before you proceed any further, keep your coat and hat at a place where you can see them from here. This court will no more be responsible for any loss or theft" said the judge.

4. "You please marry Mr. Paul," said the dying husband to his wife who was at his bedside (of course very very unconcerned about her husband's condition).

"Thank you very much, dear" said she, "But why do you make a particular reference to Mr. Paul?"

"Yes. I can never think of a greater punishment for him for having palmed off that old automobile at such an exorbitant price" said the husband in a very weak tone.

5. The fugitive's lawyer was almost fighting with his back to wall for saving his client from the charges of first degree murder. Unfortunately an eyewitness who saw the murder was all the strength of the prosecution. At last the lawyer cross-examined the witness and asked, "Do you mean to say a stone (exhibit 1) as long as my head when hit would cause the death of a human being?"

The witness calmly said, "Unfortunately the exhibit is not only as long as your head but also as thick as your skull."

6. The husband was all engrossed in the running commentary on the test match in progress. His wife also was by the side of the radio engaged in knitting work. At last she broke out, "It may be a fact that I don't know fundamentals of cricket; but, all the same, it is not decent to speak of maidens so often as this."

NEWS MAKERS

Our felicitations to :

1. Shri A. V. Ramachandra Iyer, ACOS, promoted DCOS with effect from 13-8-1958.

2. Shri M. Jayavelu, ALWI, in scale Rs. 150-225 promoted Junior Labour Welfare Inspector in scale Rs. 200-300 with effect from 8-8-58.

3. Shri T. Ramdoss, Office Superintendent, Mechanical Department in scale Rs. 300-400 transferred to the Administrative Office and promoted Office Superintendent in scale Rs. 360-500 with effect from 25-8-58.

Our welcome to :

Shri S. Roy Chowdhry, Production and Planning Superintendent in scale Rs. 300-400 of

the Eastern Railway, Kancharapara, transferred to the Integral Coach Factory and posted Planner and Estimator/Furnishing in the same scale of pay with effect from 18-7-58.

Our best wishes to :

1. Shri V. Masilamani, Chargeman in scale Rs. 260-350 selected by the Union Public Service Commission for the post of Assistant Mechanical Engineer and released from this Administration on 12-7-58.

2. Shri S. S. Chatterjee, Chargeman in scale Rs. 260-350 transferred to the Locomotive Works, Varanasi, on the same pay and scale with effect from 11-8-58.

WEDDING BELLS



Kumari S. K. Kupppammal, Clerk, Personnel Branch was married to Shri S. Ramamoorthy, Asst. Motor Vehicle Inspector, Tambaram on 13-6-58

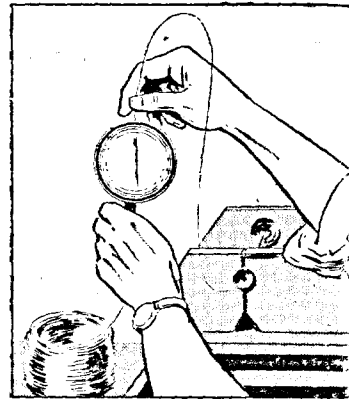


Shri K. Lakshmipathi, Progressman, Shop 22 was married to Kumari S. Kamala Selvi on Sunday, the 17th August '58 at Madras

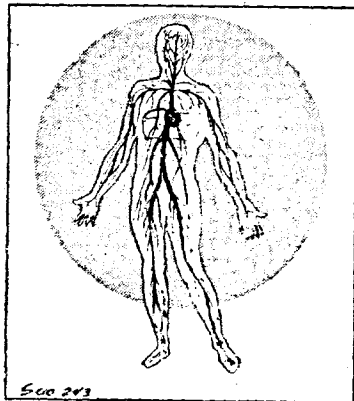
DID YOU KNOW?



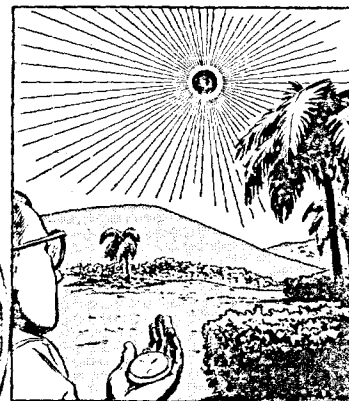
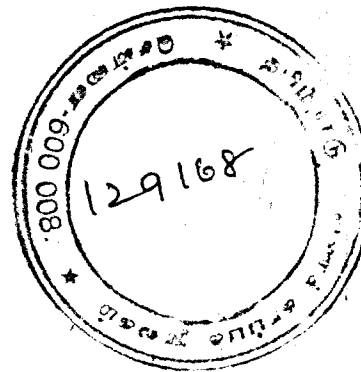
Nutrition experts declare that if a child ate as much, comparatively, as a growing bird, it would consume three lambs and a calf per day



Gold is the most malleable, or ductile, of metals. One ounce of gold (avoir-dupois) can be drawn in the form of a continuous wire thread to a length of 51 miles.



The human heart stops for one-sixth of a second between beats. As a result, your heart stands still for a period equal to one-sixth of your lifetime



The maximum possible duration of an eclipse of the sun is 7 minutes 40 seconds. This could only occur at the Equator, but the longest actually occurring since 717 A.D. was on June 20, 1955. It lasted 7 minutes 8 seconds and was visible from the Philippine Islands

DL
DSIS 1119, 1955
1955.2.10