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Vol. III



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RAILCOACH

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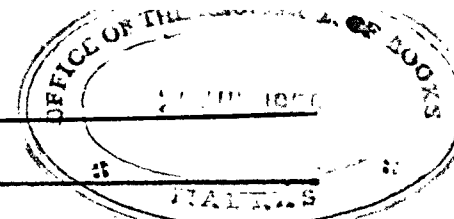
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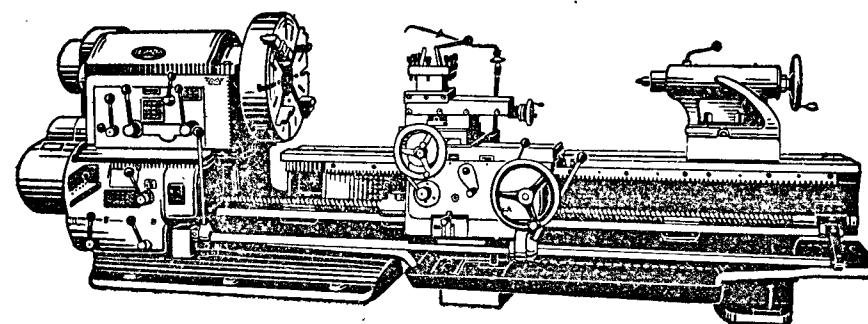
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(INTEGRAL COACH FACTORY MAGAZINE)

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.

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CONTENTS

MAY 1959

	PAGE
Editorial	4
Railway Week Celebrations in the Factory	5
Cultural Show at Delhi during Railway Week	21
Important Aspects of the Integral Coach Factory	23
A New Method of Stud Welding with Welding Cartridges	27
News from Switzerland	36
The Doyen of 20th Century Architecture	37
Visitors to the Factory	41
Diesel Electrics for Rourkela	43
Summer in Madras	45
• Brain Teasers	46
Wit and Whistle	47

editorial

INTEGRAL COACH GOES TO RED CROSS EXHIBITION

Those who visited the Red Cross Exhibition held in the Island Grounds had a pleasant surprise when they saw an Integral Coach ready for traffic stabled there. How the coach happened to be there was a mystery to quite a few and all the visitors to the Exhibition were fascinated when they heard the saga of the travel of the coach to the Island Grounds. Transporting a rigid tube nearly 11 ft. wide and 70 ft. long is no mean achievement, as the movement of the coach over the public roads was permitted only during night time, that too after the traffic had come to a standstill, and taking the coach over the curves in the road and viaducts called for great ingenuity. The credit for taking the coach safely to the Island Grounds goes to our Assistant Mechanical Engineer/Plant, Sri G. Debrass and his able band of assistants of the Millwright headed by Sri Srinivasan, their foreman.

The display of the coach in the Exhibition provided an opportunity for a large number of people to get to know the comfort and safety which the Integral Coach provides and also the significant part played by the Coach Factory in the economy of the country. Both the public and the Press were interested to know that each coach turned out by the Coach Factory represented a saving of Rs. 1.5 lakhs of foreign exchange, that the factory offered employment to nearly 7000 men and that nearly 500 industries were being sustained by the factory.

The display of the coach in the Exhibition was by itself novel in that the coach was taken to the populace, contrary to the normal occurrence of travelling public going to it.

We have published elsewhere two pictures to give an idea as to how the coach was transported to the Island Grounds. We are sure the readers will find the pictures interesting.

RAILWAY WEEK CELEBRATIONS IN THE FACTORY

FILM SHOW FOR CHILDREN

A film show was arranged during Railway Week in the Technical School Auditorium at 19-00 hours on 10th April, 1959. The show was attended by 300 children. The following films were screened :

- (1) Community Workshop (Colour-Tamil) 20 minutes.
- (2) Cleanliness brings health (Colour-English) 10 minutes.

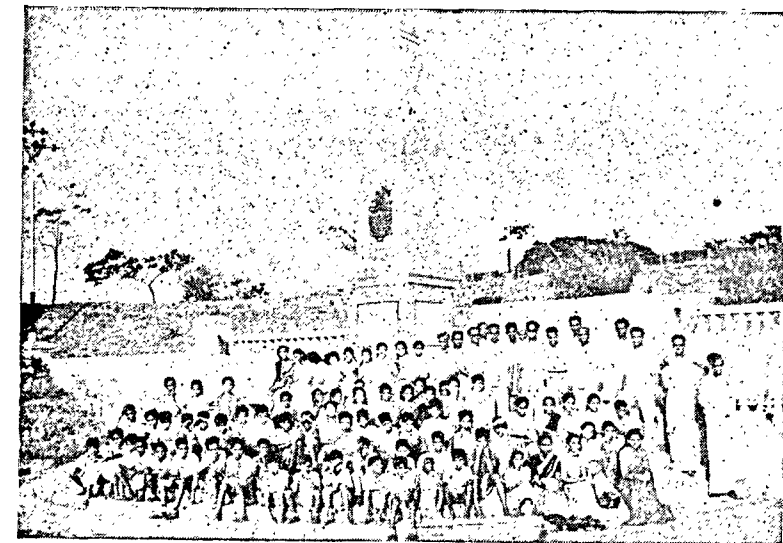
- (3) I looked at Britain (Black and White. Tamil) 20 minutes.
- (4) Gardens of England (Colour-English) 10 minutes.
- (5) Design for Growing (Colour-English) 20 minutes.
- (6) Tennessee Holiday (Colour-English) 25 minutes.

The films were much enjoyed by the children and elders alike.

CHILDREN'S EXCURSION TO TADA

On 11th April 1959 a party consisting of Shri T. D. Ramabadran, A.S.O.R., and Shri about 100 children of I.C.F. employees accompanied by experienced guides and led by T. D. Jayaram, W.O., left the I.C.F. Institute at 7 a.m. on an excursion to Tada near Sulurpet.

Children of I.C.F. Staff, who had a pleasant excursion to Tada during Railway Week



En route, the party stopped at Red Hills Water Works for a while, and after seeing the works and taking light refreshments there, proceeded to Tada. The party reached Tada at about 10.30 a.m. The children were then taken to the seashore and to the site where salt is being procured.

On return to the Travellers' Bungalow at Tada, the party had their midday meals at about 12.30 p.m., and the children retired under the shady lawns of the bungalow for some

time. A few of the children were indulging in light music. At about 3 p.m., the party left Tada for Poondi and reached Poondi reservoir at about 4.30 p.m. The children were taken first to the Rest House which is situated only a few yards away from the dam and then were taken round the reservoir. The party then left Poondi at about 5.45 p.m.

Throughout the journey the children were cheerful. It was about 7.30 p.m. when the party returned to the I.C.F. Institute.

VISIT OF LEADING BUSINESSMEN DURING RAILWAY WEEK

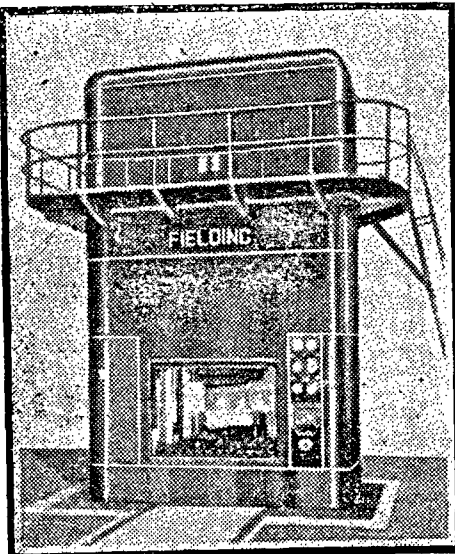
In connection with the Railway Week Celebrations 1959 leading businessmen in the city belonging to various industrial interests were invited to visit the I.C.F. They came to the Factory on the 13th April 1959 and were received by the Chief Mechanical Engineer, Shri K. Swarup. They were taken round the workshops of the factory.

They were very much impressed with the progress made in the factory during the last

3½ years and felt proud that Madras had such a well-laid out modern factory. They congratulated the administration and workers on their splendid achievement.

The purpose of requesting the businessmen in the city to visit the factory was to give them an idea of the work being done in the factory and an opportunity for them to explore possibilities of co-operating with the public sector in the matter of indigenous manufacture of coach components, fittings, etc.

Leading businessmen in the city visited the factory during Railway Week in April 1959. Photograph shows the businessmen just emerging out of a fully furnished coach which they inspected during their visit

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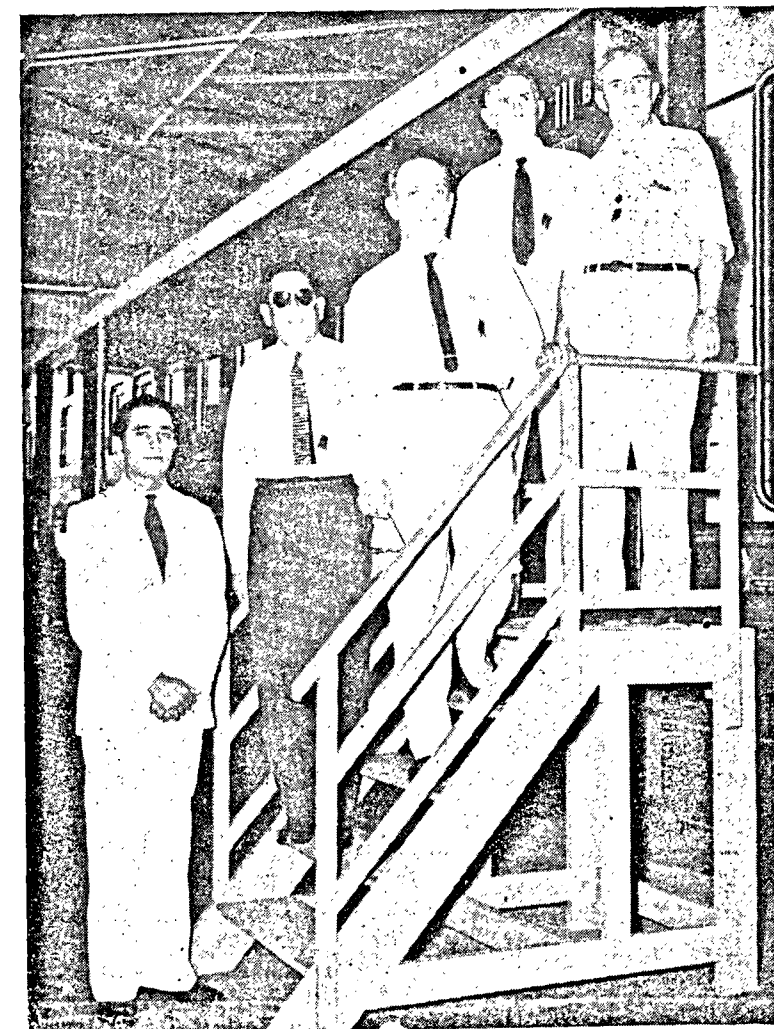
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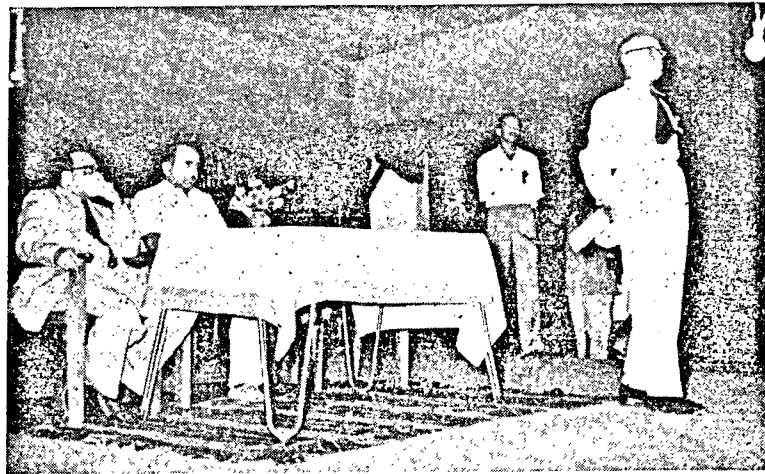
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STORES DEPOT CELEBRATION



Shri T. S. Jayaraman addressing the gathering at the Railway Week Celebration at the Stores Depot

As in the previous years, the Stores Depot celebrated the 'Railway Week' in April this year. Shri R. K. Tandon, Deputy Controller of Stores, presided and Shri A. D. Rao, Director of Supplies and Disposals, Madras was the Chief Guest. There was a large gathering of guests which included an appreciable number from the families of employees.

A special feature this year was the getting up of an orchestra by the staff of the Depot and putting up an 'one-act' play in English. There was also a Fancy Dress competition. Prizes were distributed by Mrs. Aiana to the staff and their family members who came out successful in the sports and various other events.

In welcoming the President, the Chief Guest and the invitees assembled, Shri T. S. Jayaraman DCOS/D referred to the presence of a large number of members of the families of the staff on the occasion and expressed satisfaction that the object of the 'Railway Week' viz., 'getting together' of all the staff and

their family members on this occasion was being fulfilled in an increasing measure from year to year. He read out messages received from Shri K. Swarup, Chief Mechanical Engineer, who had to be away on duty and also from Shri K. Sadagopan, former Chief Administrative Officer. Shri Jayaraman alluded to the topical problem that is engaging the attention of all Storesmen viz., the necessity for bringing down the Stores Balances on the Railways and exhorted the staff to modify their methods of recoupment and stocking to bring about the desired result. He said that the time had come for the Storesman to give the consumer the maximum satisfaction with minimum stock.

Shri R. K. Tandon, the President of the evening, paid tributes to the Chief Guest with whose co-operation in the official field, the I.C.F. Stores Department had been able to satisfy its consumers. He explained the significance of the 'Railway Week' and also paid tributes to the staff of the Depot Stores who had

co-operated and got up such a nice function. He exhorted the staff to keep up the standards they had established and improve on their performance.

The Chief Guest, Shri A. D. Rao, paid tributes to the I.C.F. for contributing to the nation's progress by appreciably improving their targets. He said that such functions as the 'Railway

Week' brought to light what the Railways were doing and unless a certain amount of publicity was done by the Railways, the public would not have a correct perspective of the Railways' working. He said that celebrations like the Railway Week afforded just such an opportunity for the public and the Railwaymen to come together and get to know each other.

PROTECTION FORCE DAY

The Railway Week was celebrated by the Railway Protection Force on 14th April, 1959, the Tamil New Year's Day. The function commenced with a mass P.T. It was followed by a double-head torchlight tattoo and an electric torchlight tattoo. In between each item, there were miscellaneous items as mimicry, comic dialogues, and display of yogasana, fire dancing and cane-ring feats. Throughout the

function, the full complement of the Railway Protection Force Band of the Southern Railway, in their colourful costume, entertained the large gathering of 2000 with their excellent music. The Chief Mechanical Engineer, who presided over the function, spoke about the significance of the Railway Week and congratulated the Railway Protection Force for the nice show put up that evening.

The Railway Protection Force which provided excellent fare during the Railway Week celebrations



HANDICRAFTS EXHIBITION

In response to the call for exhibits for the Handicrafts Exhibition in connection with the Fourth Railway Week Celebrations 1959, the number of exhibits received group-wise is shown below.

- (1) Paintings—No. of exhibits 25 by 12 employees.
- (2) Embroidery—No. of exhibits 34 by 6 persons.
- (3) Wooden articles—No. of exhibits 22 by 12 persons (3 from Bharathi Scout Group).
- (4) Miscellaneous—No. of exhibits 11 by 9 persons.

Seven specimens adjudged best and second best in the following four categories were sent to Delhi for display at the Handicrafts Exhibition conducted during Railway Week. The details of items selected are given below :

- (1) Paintings—2
- (2) Embroidery—2
- (3) Woodwork—2
- (4) Miscellaneous—1

There was a good collection of craft work, and artistic work worth appreciation. Exhibit of Embroidery work by Kumari T. P. Raja-

lakshmi Menon, daughter of Shri P. S. Menon, Senior Lecturer, T. T. School and Shrimathi U. Lal, wife of Shri M. Lal, Principal, Technical School, Mandolin made by K. Narayanan, Carpenter, Shop 40 were really of a high order. Seven prizes were given for the exhibits, 2 in each group. The names of the Craftsmen whose exhibits or handicrafts won prizes are shown below :

- (1) Paintings : B. S. Duemen, Chargeman/Fur; G. Selvaraj, App. Welder, Coach Factory.
- (2) Embroidery: T. P. Rajalakshmi, daughter of Shri P. S. Menon, Senior Lecturer, T.T.S.; Shrimathi M. Lal, W/O P.T.S.
- (3) Woodwork : K. Narayanan, Carpenter, M.W. Shop, Coach Factory ; G. Devanathan, Carpenter Instructor, T. T. School.
- (4) Miscellaneous : P. Nainakannu, Apprentice.

The prizes were given away at the special function held at 18-30 hours on the 16th instant at the Apprentices' Hostel.

PRESENTATION OF AWARDS AND PRIZES

A colourful function was conducted in the spacious lawns of the Apprentices' Hostel on the evening of the 16th April 1959, the last day of Railway Week, for the presentation of medals, certificates, and prizes. The lawns were tastefully decorated and illuminated for the occasion.

Shri K. M. Aiana, Deputy Chief Mechanical Engineer, Furnishing, welcomed the large

gathering of employees and requested Shri K. Swarup, Chief Mechanical Engineer, to address the gathering and distribute the awards and prizes.

Shri O. S. Murthy, formerly Engineer-in-Charge of this factory, at present Director/Planning, Railway Board and a recipient of the "Padma Shri" award from our revered Rashtrapathi, was a guest on the occasion.



Chief Mechanical Engineer, Shri K. Swarup, gave an inspiring address to the large gathering of staff

The function was unique in that it was held outside the workshop area for the first time and this enabled the parents, wives, children and other family members of employees' families to witness the proud recipients of medals and certificates (awarded for meritorious service during the past year) being honoured.

Addressing the large gathering Shri K. Swarup, Chief Mechanical Engineer, said : "Friends and Fellow Workers,

"We are meeting today to celebrate the Railway Week which marks the completion of the 106th year of the Railways' existence in India. The Railway Week was introduced about four years ago to strengthen the *esprit de corps* amongst the Railwaymen as also to establish closer contacts between the Railwaymen and the public.

"We started in a very small way 3 years ago and gradually our celebrations are becoming more and more popular. On the concluding day of the Railway Week we usually give prizes to the outstanding workers of the Factory and we shall be doing the same this year also. This year, however, we have started a few other innovations. Besides the Governor's Cup to the most efficient section, the Railway Week trophy for the best maintained manufacturing Shop, Braem's Shield for the best maintained assembly shop, Safety Shield for the safest shop and a shield for the best kept ward, prizes are being given this year to the best kept Type I and II quarters in the colony.

"We also started in the Institute Amateurs' nights during the year in order to encourage cultural activities from which to select items

for participation in the Cultural Shows in Delhi and in I.C.F. These have become very popular. I wish that you will all take full advantage of these 'Amateurs' nights in the next year also and put up creditable shows. To be a good worker alone is not enough in the present times, but you must be a good citizen and also develop cultural and intellectual activity to keep your spare time properly utilised. That will give you the necessary relaxation to keep good health and bring credit to yourself.

"This day being the anniversary day of the Railways, it is also customary for us, Railwaymen, to take stock of our performance during the last year and to have a clear picture of the steps to be adopted in the next 12 months so that successes can be ensured and shortcomings eliminated. During the year April 1958 to March 1959, our achievements have been very significant. The outturn has increased from 222 to 380 shells from the shell side and from 72 coaches to 171 coaches on the furnishing side. The average cost of manufacture has come down from Rs. 1,22 thousands to Rs. 92 thousands on the shell side and on the furnishing side from Rs. 97 thousands to Rs. 66 thousands. The man hours employed have also come down to 9,400 from 19,000 on the shell side and from 12,548 to 6,428 on the furnishing side. The quality of work has been uniformly good and the strength of the staff has risen from 5,500 to 6,700.

"As we all know, the second shift has now been sanctioned and we have a busy programme ahead of us. The programme for the next year is to produce 510 shells, and 275 coaches on the furnishing side. We cannot rest on our past laurels; we will have to work harder and harder to achieve these targets and contribute our mite towards the prosperity of the country.

"I am also glad to state that the Permanent Furnishing Unit has now been cleared and

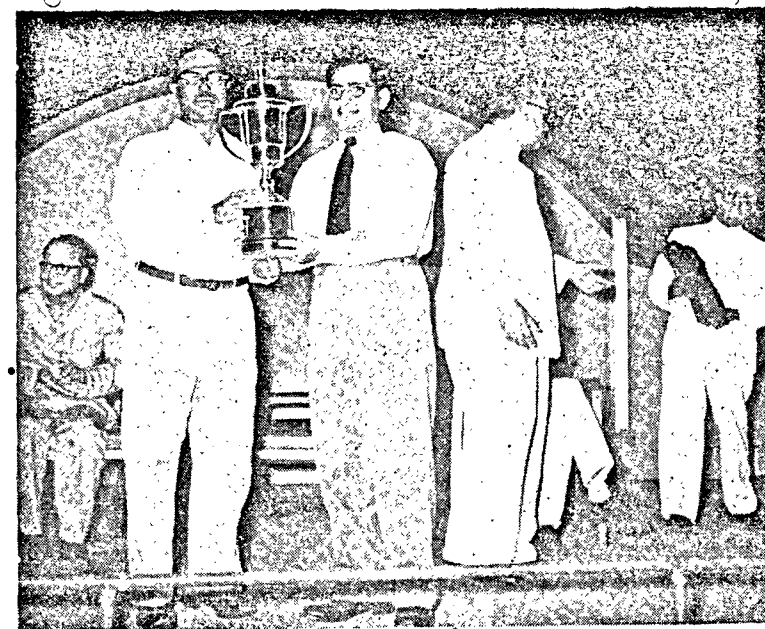
very soon full activity will be concentrated to complete the Permanent Furnishing Project. Only when we are able to furnish all the shells produced on the shell side, it will give us complete satisfaction.

"As a modern industrial administration, our attention cannot be confined only to figures of actual production, however important they may be. The other primary objective of ours is to foster the friendliest relationship between the administration and the vast body of our workers, without whose willing and sustained co-operation, success like this is impossible. I am indeed grateful to all the I.C.F. members including the ladies and children for their willing co-operation and the assistance that has always been forthcoming from them in any venture that we have undertaken. It is because of this good atmosphere, good understanding and good co-operation that we have come to be recognised as one of the best run factories in India, and our social and cultural functions are accepted as of a high standard. Our Sports Teams, Football, Hockey, Cricket and Volleyball teams, have been showing splendid form and during the last year our teams won all the four Major Football Tournaments in Madras and annexed two hockey cups.

"The Technical Training School, besides functioning at its full capacity, has also made considerable progress during the year and has been responsible for providing skilled artisans and trained supervisors for the Factory, without which it would have been impossible to achieve the results which we have done.

"I must thank the Swiss collaborators whose unstinted work has contributed a lot to the fast progress we have been able to forge in the past few years.

"I must express our thanks to the splendid work done by the Horticultural staff in giving us good gardens and making the Factory as well as the Colony look much more pleasant.



Shri D. Kesavan and Shri B. N. Dey, Chargemen of Sections 163 and 112 respectively displaying proudly the Governor's Cup awarded to the Most Efficient Section in the factory, during Railway Week

The Sanitary Staff, the R.P.F., the Electrical Staff, the Stores, the Engineering Staff and the Clerical and Accounts Staff have all put in their best effort to give the workshop staff the necessary assistance in order to achieve the success that they have done. During the last year, the Welfare Staff have also put up a Handicraft Centre for the benefit of the ladies of the families of staff and are now engaged in starting a vocational training centre for the benefit of the children and relatives of employees.

"I must here mention the staff council due to whose co-operation and assistance, a very cordial relationship has continued to exist between the employees and the Administration.

"My thanks are also due to the splendid work put in by the I.C.F. Institute authorities for providing entertainment, both social and cultural, for the benefit of the I.C.F. staff. They have done a splendid job during the last year under the Presidentship of Shri Aiana

and the popular secretary, Shri Pillai. I will be failing in my duty if I do not express a word of gratitude to the ladies and children of the I.C.F. Colony who have given all co-operation to the Administration in making the visits of V.I.P.s and all institute functions a grand success. May the next year bring you all success and prosperity in your life. As the Leader of the I.C.F. family, I would pray that Almighty may shower His choicest blessings on you during the next 12 months.

"JAI HIND."

Shri Swarup then distributed the prizes, medals and certificates to winners. 39 employees were given gold plated medals for outstanding service and 24 were given merit certificates. This was followed by presentation of trophies for the most efficient section, the best maintained manufacturing shop, the best maintained Assembly Shop, shop with the least number of accidents and the best kept ward

in the depot stores. As in the year past, prizes were given for the best and the second best exhibits in the Handicrafts Exhibition.

To encourage colony residents to keep their houses clean and tidy, attractive prizes were instituted this year for the best kept houses amongst type I and type II quarters in the colony and these prizes were also given away at the function.

The prizes for the various competitions were utility articles in keeping with the nature of the competitions.

Medals were awarded to garden khalasis in appreciation of their devotion to duty without which it would not have been possible for the factory gardens to have been adjudged the best maintained industrial gardens for four years running.

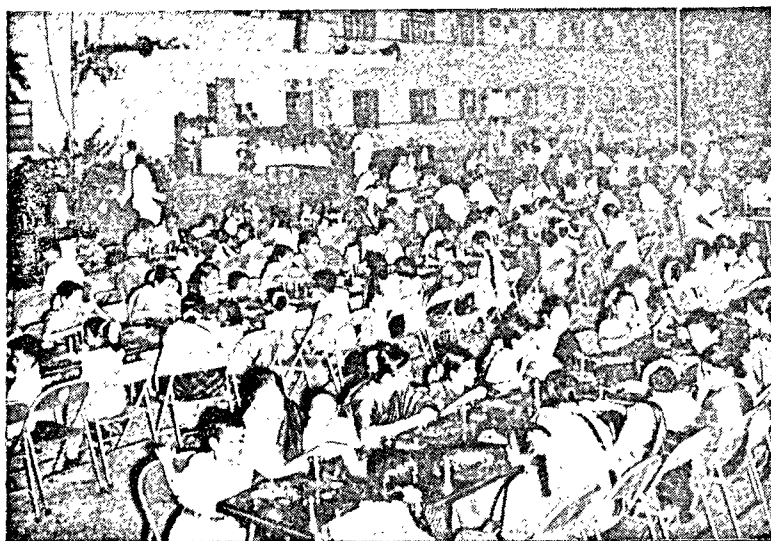
After the award of these prizes, the gathering numbering over 1000 adjourned for dinner. The purpose of the dinner was to arrange for a get-together among employees and is becoming increasingly popular. The vast gathering

seated in an orderly fashion at tables arranged in a picturesque manner on the spacious lawns under a graceful canopy of stars, was a pleasant sight, elevating the observer out of the mundane. The officers and staff of the factory and their family members mixed freely and there was a feeling of informality and gaiety in the air. Following the dinner, there was a colourful display of fireworks.

A list of medal winners is given below :

- (1) Shri D. Radhakrishnan, Subedar/R.P.F.
- (2) Shri A. R. Mogaliah, Chargeman (Reclamation)
- (3) G. Bhaskaran Nair, Machinist, Skilled, Shop 10.
- (4) Shri K. Ramachandran, Foreman, Shop 11.
- (5) Shri Syed Hussain, Welder, Shop 11.
- (6) Shri R. Rajanarayanan, Fitter, Shop 21.
- (7) Shri M. Ramakrishnan, Mistry (Welder) Shop 21.

Occasion for an ideal get-together between workers and officers of the factory and their family members was amply provided by the community dinner held on the spacious lawns of the Apprentices' Hostel on the 16th April '59 during Railway Week



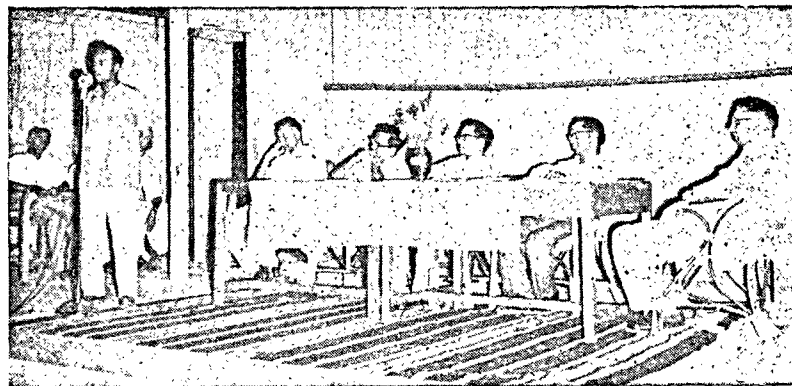
- (8) Shri I. S. Storey, Chargeman (Fitter) Shop 22.
- (9) Shri Ahindra Kumar Bose, Welder, Shop 22.
- (10) Shri N. Balraj, Painter, Skilled, Shop 25.
- (11) Shri T. Raghunathan, Mistry, Shop 26.
- (12) Shri P. R. T. Thulasingham, Draftsman, Jig & Tool.
- (13) Shri T. G. Arumugham, Draftsman, Coach Design.
- (14) Shri R. Ramamurthi, Highly Skilled, Shop 40.
- (15) Shri M. Bakthavatsalu, Khalasi, Shop 40.
- (16) Shri Mohamed Ebrahim, Highly Skilled, Shop 41.
- (17) Shri D. Santhanam, Workshop Instructor, Tech. Training School.
- (18) Shri M. Milton, Senior Chargeman (Welder) Shop 16.
- (19) Shri T. R. Venkateswaran, Chargeman, Shop 16.
- (20) Shri S. Chinnaswamy, Blacksmith, Shop 13.
- (21) Shri V. Ramachandran, Fitter, Shop 18.
- (22) Shri B. Sarangapani Mudaliar, Chargeman, Inspection.
- (23) Shri T. A. Taylor, Foreman, Shop 30.
- (24) Shri P. Velayutham, Chargeman, Saw Mill.
- (25) Shri A. Richard, Skilled Fitter, Shop 30.
- (26) Shri D. Sampathkumaran, Inspector of Works.
- (27) Shri D. Loganathan, Skilled Mechanic, Plant Park.
- (28) Shri E. V. Kulasekharan, Chargeman, Electrical.
- (29) Shri M. S. Balagangadharan, Clerk, Stores Department.
- (30) Shri S. Narayanaswamy, Depot Store-keeper.

- (31) Shri M. Munuswamy, Lorry Driver.
- (32) Shri T. S. Ranga Iyer, Sub-Head (Books Section) Accounts.
- (33) Shri S. Nagarajan, Clerk, Grade I, (Stores Purchase).
- (34) Shri T. S. Govindarajan, Head Clerk, Confidential.
- (35) Shri K. Ramankutty Menon, Head Clerk Furnishing (P.B.).
- (36) Shri S. R. Srinivasa Raghavan, Senior Clerk, C.A.O. (R)'s office.
- (37) Shri Narayana Govinda Pillai, Head Clerk, CAO (R)'s office.

Merit awards have also been made to Shri K. M. Sreedharan, Skilled Fitter, Shop 30 and Shri B. Madhusoothanam, Sub-Inspector, R.P.F.

The list of employees that were awarded certificates for meritorious service are given below :

- (1) Shri S. K. Sen, Chargeman, P.E.'s office.
- (2) Shri C. K. Tharu, Fitter, Shop 20.
- (3) Shri K. P. Velunni, Fitter, Shop 20.
- (4) Shri K. R. Hooli, Fitter Skilled, Shop 22.
- (5) Shri J. Jothilingam, Mistry, Fitter, Shop 24.
- (6) Shri M. S. Vasam, Sand Blaster, Shop 25.
- (7) Shri A. Rajagopal, Fitter Skilled, Shop 26.
- (8) Shri K. Chandrasekhara Rao, Draftsman, Coach Design.
- (9) Shri P. Rajabathar, Chargeman, Shop 40.
- (10) Shri C. K. Sambandam, Motor Mechanic
- (11) Shri N. Devarajulu, Asst. Master, Technical Training School.
- (12) Shri Benjamin Kulangara, B.T. Instructor, T.T.S.
- (13) Shri G. Villiam, Skilled Electric Plater, Shop 15.
- (14) Shri K. Ramaiyan, Chargeman, Inspection.



The symposium held during Railway Week was a fair opportunity for staff to exhibit their oratorical talents

- (15) Shri V. M. Sankaranarayan, Mistry, Inspection.
- (16) Shri C. P. Gajendran, Senior Clerk, Shop 26.
- (17) Shri B. S. Ganesh, Chargeman, Production Office.
- (18) Shri C. Venu Achary, Skilled Carpenter, Shop 30.
- (19) Shri K. Dasarathan, Peon, Stores.
- (20) Shri S. Balasubramanian, Sub-head, Cost Accounts.
- (21) Shri A. Gopal Rao, Clerk, Grade I.
- (22) Shri K. Balakrishnan, Sanitary Jamedar
- (23) Shri O. Perumal, Gangman.
- (24) Shri U. Kanniah, Highly Skilled Artizan.

Trophies

1. Most Efficient Section : Governor's Cup for the most efficient section has been awarded jointly to Sections 163, 112, and 30 under Chargemen, Shri D. Kesavan, Shri B. N. Dey and Shri Mangapathy Rao, respectively.
2. Railway Week Trophy for the best maintained Manufacturing Shop goes to 'J' Shop (Shri A. Ramdoss, Foreman).
3. Braem's Shield for best maintained Assembly Shop goes to 'C' Shop (Shri V. Narayanaswamy, Foreman).

4. Safety Shield for effecting great reduction in the percentage of accidents compared to last year goes to Shop 41 (Shri De Cruz, Foreman).
5. Shield for the best kept Ward goes to 'A' Ward, Shell Depot (Shri E. Chitti Babu, Ward Keeper).

Tidy House-scheme

- Type I, Block No. 8, Unit No.9, Shri A Subbusamy, Sainik.
- Type II, Block No. 20, Unit No. 12, Shri C. K. K. Pillai, Head Clerk, CME'S office.

Symposium

English :

- Shri K. Vaidyanathan, Auditor/Statutory Audit—First Prize, "A decade of Independence."
- Shri T. Srinivasaraghavan, Clerk, Estt. Section, Dy. COS's office—Second Prize, "Participation of workers in Management."

Tamil :

- Shri V. B. Purushothaman, Senior Clerk, WM's office, First Prize, "A decade of Independence."
- Shri C. R. Devarajan, Clerk, P. 4 Section, Dy. COS's office—Second Prize, "A decade of Independence."

Awards to Garden Staff

- Shri C. Ramulu, Garden Khalasi.
- „ A. Subramani, Garden Khalasi,
- „ K. Subramani, Garden Khalasi,
- „ R. Perumal, Garden Khalasi,
- „ R. Palani, Garden Khalasi,
- „ M. Sambandam, Garden Khalasi,
- „ P. Arumugam, Garden Khalasi,

- Shri R. Manickam, Garden Khalasi.
- „ K. Munuswamy, Garden Khalasi.

The two-fold object of focussing the attention of the public on the activities of Railwaymen and promoting a spirit of camaraderie amidst Railwaymen was achieved during the Railway Week celebrations in the factory.

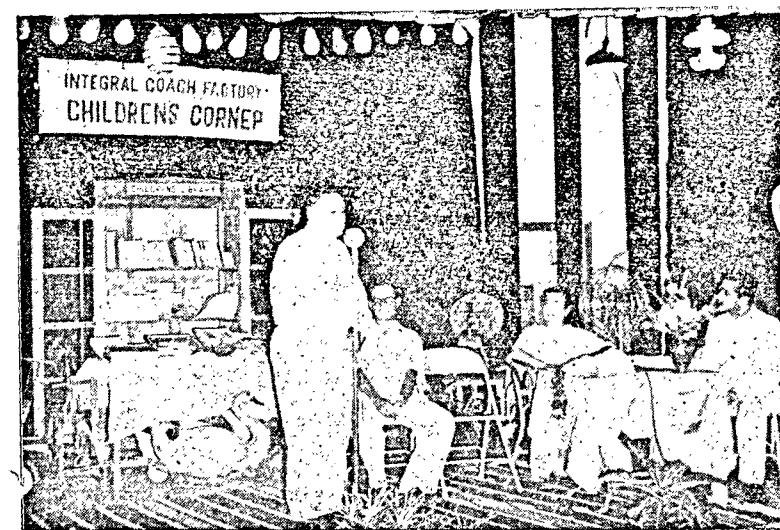
CHILDREN'S CORNER

As part of the Railway Week Celebrations in the I.C.F., the Institute authorities got up a pleasant function on 15th April 1959 to inaugurate a Children's Corner there. The hall was tastefully decorated with balloons, Chinese lanterns and colour paper rolls and there was a good attendance. After prayer by the children of the I.C.F. Elementary School, Smt. Mukerjee, wife of the General Manager, Southern Railway, and Shri Swarup, our C.M.E., were

garlanded. Shri A. V. Sugavaneswaran, DCOS/Purchase and Vice-President of the Institute, welcomed the guests and gave the background leading to the opening of the Children's Corner under the auspices of the Institute. He said :—

"After commencing production in October 1955, we have been observing Railway Week from 1956, and this year it is the Fourth Railway Week for the I.C.F. We have been

Opening of a Children's Corner for the benefit of children of I.C.F. employees formed part of the Railway Week celebrations in 1959. Photo shows our beloved Chief Mechanical Engineer speaking on the occasion





Shri Jagjivan Ram, Union Minister for Railways, presenting the Meritorious Service Award to Shri S. Arunajatai, Works Manager II, during the Railway Week Celebrations at Delhi this year

Shri Ghantasala, noted Andhra playback singer, rendering a masterpiece during the Ugadi celebrations in the I.C.F.



having an interesting array of items like Children's Film Show, Symposium, R.P.F. Tattoo, and Excursion. All these items have been fully enjoyed ; and now, ladies and gentlemen and children, I have the pleasure and honour to welcome you to this little function for little ones. It is an oft-quoted saying that 'the children of to-day are the citizens of tomorrow,' and every country is devoting better attention, care and thought to the growth and development of children. This ancient country of ours is second to none in its care and love for children. Our great national poet Kalidasa has made very touching references to children and the love for children. He writes "Fortunate indeed is the parent whose dress is soiled by his child who is sitting on his lap after play.' Our great Tamil poet Saint Tiruvalluvar has also devoted quite a few couplets to children. In one of his verses he says that only those people will talk of the sweet melody of the veena and the flute who have not heard the sweet lisp of their children.

"In highly developed countries in Europe and America, people have been endowing enormous sums of money and great time and thought to the development of children. They provide very happy surroundings and a very congenial atmosphere for the all-round growth and development of children. No doubt these children blossom excellently in all walks of life into Scientists, great Statesmen and great Sportsmen. What facilities are we given in this country to bring our children up in ideal surroundings? In fact our children grow by themselves. May be we have great love and affection for them. But very little is done concretely. Here again, as it has happened in other spheres, it has fallen to our dear Prime Minister Shri Jawaharlal Nehru to give a lead in the matter. He had decided some years ago that his birthday on the 14th November every year should be celebrated as "Children's Day.' All over the country, on that day,

people try to do something for children and in some places people start Parks, Corners and such other things for children and try to give an opportunity for children for an all-round growth.

"Here in this Institute we have been giving thought to this problem. We have a membership of 1,100 which is a very creditable strength, I should say, considering that we have a colony of barely 400 houses. We have given facilities to our Members in all phases of their activities in the field of entertainment and leisure and such finer pursuits as literature and education. We have been thinking of giving an opportunity for the children of employees also to have a pleasant hour or two after their daily schooling. And to-day we witness the fruition of those efforts to try and bring about a little Corner for the children. We have tried to obtain attractive books for children between six and twelve years and also magazines to keep them engaged. We have purchased quite a few toys and also some sets for indoor games, and we do hope that children will find them very attractive and useful. In this great endeavour of ours we have had the good fortune to have the blessings of our Chief Mechanical Engineer Shri Swarup who has been a champion of all new ideas in the Institute ever since its inception ; and we have also had the good fortune of having a very sympathetic and understanding Staff Benefit Fund Committee who have given us a munificent grant of Rs. 500 with which it was possible to make a start in the matter. We do hope that the Staff Benefit Fund Committee will continue to extend their understanding sympathy to us in the future."

Mrs. Mukerjee then inaugurated the Children's Corner by pressing a button. As soon as the button was pressed, the buzzer sounded while a screen went up throwing open to sight the various amenities provided for children's entertainment and education.

There was a good collection of children's books as well as indoor game equipments such as Chinese chess set, house building and other pictorial blocks, carrom board, etc. There were also a few rocking horses, a toy motor car, a toy cycle, a toy scooter and other playing equipments for children. Brightly painted cane furniture suitable for the children was also on view.

Mr. Swarup, the President of the evening, then addressed the gathering. He said:

"I am very glad to see this Children's Corner being opened to-day by Mrs. Mukerjee, wife of our popular General Manager of the Southern Railway. I do wish and hope that our young generation, the children of the I.C.F. Colony, will derive the maximum benefit and advantage from this Children's Corner. You are the future hopes of India and we are all toiling in our generation to see your generation

and the generations to succeed, prosper and bring prosperity to our beloved Motherland, India. So much depends on you and I do hope that by this Children's Corner you will derive the advantages meant for you and you will become better citizens of tomorrow and bring prosperity to the Mother country."

Shri Aiana proposed a vote of thanks.

The function was followed by a Variety Entertainment. Shri Peterson, Inspection Foreman, gave a few items of Western music accompanied by his children. This was followed by Kumari Prapullah, niece of Shri Sundaram, Chargeman, Electrical, who gave a few songs in Karnatic music. The entertainments came to a close with a mimicry by Shri Ramesh Chandra and two dance numbers given by Baby Chandra which were greatly enjoyed by the gathering.

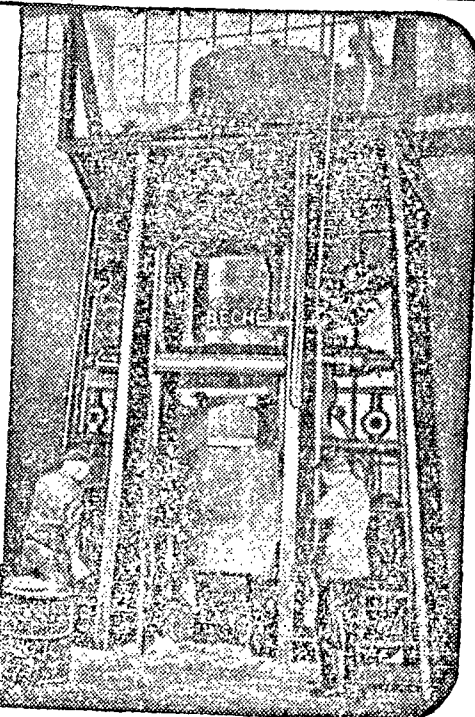
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CULTURAL SHOW AT DELHI DURING RAILWAY WEEK



The Moplah Dance troupe which participated in the Cultural Show at Delhi during Railway Week with its able leader, Mr. M. N. Menon, AWM.

The I.C.F. "MOPLAH DANCE" team led by Shri M. N. Menon, AWM, left for Delhi on the 6th April 1959 and reached Delhi on the 8th morning. There were two full dress rehearsals at the Kishanganj Stadium on the 8th and 9th at which the General Manager and Senior Officers of the Northern Railway and a large gathering were present.

The Railway Week was inaugurated at the Delhi-Kishanganj Stadium by the Hon'ble Minister for Railways, Shri Jagjivan Ram, on the 10th evening. The Kishanganj Stadium was gaily decorated and artistically illuminated with hundreds of multi-coloured bulbs and illuminated fountains which presented the appearance of a fairyland. The huge stage with its marvellous artistic background presented a fitting arena for the festive occasion.

Among the items selected for presentation from the opening day itself was the "MOPLAH DANCE" presented by the I.C.F. team. There were 14 artistes, all employees of the I.C.F.,

working in the various shops, who participated in the dance.

The Moplahs are the descendants of the early Arab settlers on the West Coast of Southern India. Though essentially a trading community, they are a valiant race and in the early days, they helped the then rulers of Calicut to defend their kingdom against invaders and acquitted themselves gloriously on the battlefields. On festive occasions, they perform folk dances clad in traditional costumes, waving and beating sticks and moving round in circles, the participants interchanging positions in quick succession to a set rhythm. This dance requires a very high standard of symmetrical movement, being essentially a martial dance in its tempo and a faulty step or movement is likely to cause injury to other participants. The Moplahs in their typical Lungis and scarves in multi-coloured designs presented their item with perfect symmetry and grace. Further charm

RAILCOACH

was lent to the dance by the melodious song, specially sung for such occasions.

The performance was again repeated on the 11th and 12th April 1959 in the presence of a large and distinguished gathering. On the last day, the Hon'ble Deputy Minister for Railways Shri S. V. Ramaswamy was also present. The artistes received certificates from Shrimathi P. C. Mukerjee, on the 14th morning at a special function held at the Northern Railway Stadium.

A second troupe consisting of the Chinese Acrobatics, Self Defence and Fire Display teams were led by Shri T. Ramdas, Organisation Inspector. They participated in the Camp Fire held on 15th April 1959.

They had three rehearsals, one at the Northern Railway Stadium, New Delhi and two at Kishanganj. The Hon'ble Minister for Railways presided over the Camp Fire on 15th April 1959 at the Kishanganj Open Air Theatre, where a large number of workers and their families and a good many special invitees were present. All the items were immensely liked by the spectators. The Hon'ble Minister and the Deputy Minister for Railways, General Manager, Northern Railway, and other distinguished invitees appreciated the talents and smartness of our artistes. A great debt of gratitude is due to the Northern Railway for the hospitality extended to the teams in every direction, which gave them an inspiration to put up excellent performances.

Shri B. B. Mathur, General Manager of the Northern Railway, New Delhi, has written a D. O. letter to our Chief Mechanical Engineer, Shri K. Swarup in appreciation of the I.C.F. troupe that participated in the Cultural Show at Delhi during Railway Week between April 10 and 16, 1959. The letter is reproduced below :-

My dear Swarup,

28th April '59

FOURTH RAILWAY WEEK 1959

Please accept my grateful appreciation of the invaluable assistance received from you in connection with the successful staging of the Central Cultural Shows at Delhi.

The team sent by you won considerable applause for its performance. Our warm appreciation may please be communicated to the participating artistes.

Yours sincerely,

(Sd.) B. B. MATHUR.

SHRI K. SWARUP
Chief Mechl. Engineer
Integral Coach Factory
Perambur, Madras 23

IMPORTANT ASPECTS OF THE INTEGRAL COACH FACTORY

English translation of a talk in Tamil by Shri A. V. Subramanian, Personnel Officer, I.C.F., broadcast over Akashvani, Madras, during Railway Week on 13th April, 1959.

The Integral Coach Factory, Perambur, which was started in March, 1952 to produce integral coaches for the Indian Railways, at an estimated expenditure of Rs. 7.35 crores, started production from October 2, 1955. Integral coaches have several advantages over the conventional coaches, chief among which can be mentioned the lightness of construction and the possibility of reduced risk during accidents. The Factory, in the very first year, produced 43 unfurnished coaches against the original target of 20 and the increased target of 40 coaches. In the second year, against the increased target of 120, 150 shells were produced and in the third production year, 300 shells against the target of 240, were produced.

In addition to exceeding the targets, we have been able to reduce the cost of the shell so that its price now is less than that of imported shells. The quality of shells and furnished coaches produced in the Integral Coach Factory compares very favourably with that of the imported coaches. According to the Swiss Experts, the quality of the coaches produced in the Integral Coach Factory is better than that of the imported ones. Further, the Factory which was producing only third class coaches is now being geared to produce first class coaches also. In addition to producing shells, we have started furnishing them and the current rate is 20 coaches per month. When the permanent Furnishing Factory starts production, we would be able to furnish all the shells produced in the Integral Coach Factory.

How has it been possible for a young Factory like the Integral Coach Factory to achieve so

many distinctions within such a short period? The reasons are briefly, good leadership, the high quality of the workmen and above all, the very good relationship subsisting among the employees of the Integral Coach Factory. Most of the skilled workmen in the Factory have been taken as Apprentices on the basis of selection and trained in the Technical Training School which has a well-equipped hostel attached to it. The standard of training imparted is high and the curriculum provides for theoretical as well as practical training which fits them for high quality work in the Factory very well. The good relationship and the general high level of contentment of the Integral Coach Factory employees on which I have laid stress are sustained by the sympathy and interest shown by the supervisory officials towards the workmen and by the provision of a large number of amenities which have enriched their lives and have made it most definitely worthwhile for them to serve the institution with loyalty and devotion.

One such amenity is the spacious workers' colony of 400 houses built very near the work-spot with 200 more being projected. The colony is distinguished from the others in the industrial field by broad and well laid out roads and good lighting. We have generally 4 types of houses in the colony whose allotment is based on the grade of the allottee. If we enter the house of a khalasi, the person in the lowest grade in the Factory, we find that the front verandah leads to a spacious room provided with windows. The kitchen has provision for keeping quite a larger number of articles in almirah-like structures. There is provision for bathing and for a small garden

too. The whole house of course, is electrified, provided with taps and with a flush-out system. The houses of Senior Subordinates have 4 rooms in addition to a kitchen, a pantry and a bathroom and latrine.

We have next, the school in the colony which provides instruction upto the V Standard. There are schemes on hand to expand the Primary School to a High School to avoid the children of the colony undertaking an unpleasant journey to and from the schools in the neighbourhood. Very near the colony, we have a children's park where there is provision for healthful games ; this is open to all the children of the colony without distinction. It is proposed to open a vocational training centre for the children of employees with facilities to impart training in 2 trades for about 40 pupils.

Most of the adults in the colony are members of the I.C.F. Institute, the premises of which are situated across the road. The Institute has a nice building of its own, housing a very well stocked library. There is provision in the Institute for indoor games like Cards, Chess, Table Tennis and Carroms. The Institute is equipped with an open air theatre wherein plays and variety entertainments can be staged. It is usual to find a variety entertainment being staged almost every month for which admission is free for all the members of the Institute. There are quite a few amateur drama clubs in the I.C.F. started and run on the initiative of groups of employees. To give expression to the talents of these men, Amateur Evenings are organised in the Institute. But the high watermark of all artistic and cultural activities in the I.C.F. is reached during the Railway Week which is observed from the 10th to the 16th of April every year. It is accepted on all hands that only those who have developed an all round personality, prove useful and productive citizens ; this way the Institute serves a most vital need in our Factory.

Two other amenities deserve mention ; the Handicrafts Centre where the women folk of the colony learn tailoring and embroidery and the Children's Corner wherein we have a big children's library with toys for the amusement and instruction of children. The books have been chosen with an eye to entice children along the charmed path of literary adventure. "Catch them young" is the motto ; if we inculcate the habit of reading in the minds of the young folk, we would have done our duty by the next generation which is entrusted to our care.

Only a percentage of the employees of the I.C.F. can get houses in the colony. Among the rest, those who have to come from distant places are issued with free residential card passes and special workmen's trains are being run to workshop timings to enable them to be transported to and from the workspot. If the worker has a grievance requiring redressal, the Administration has provided an effective machinery to take notice of it and remove the grievance.

The whole Factory has been so built as to admit of a free flow of air and the shops are all well lighted and kept clean. The machines have been erected with sufficient inter-space to permit of the workers moving about without risk. A First Aid Post with a qualified Doctor has been established inside the Factory. Four canteens are functioning in our organization to provide snacks and tea for the employees. Wherever possible, we have grown flower plants and are proud to say that our gardens have been adjudged first for some years in the Factory Gardens Competition. The workmen feel particularly happy in working in the Shops where the drabness is relieved by colourful blooms.

A Staff Council has been established to bring to the notice of the Administration, the grievances of employees ; the Staff Council acts as an advisory body on matters of policy.

If the worker has a large family to manage and he finds that he cannot defray the medical expenses of the members of his family or the educational expenses of his children, he can ask for and usually gets an allotment from the Staff Benefit Fund for which this Administration has been allotted the sum of about Rs. 20,000 a year. The amount at the credit of the Staff Benefit Fund is also utilised towards the furtherance of sports activities which seek to build up the physical body and scouting which promotes the sense of corporate life.

We organise children's holiday camps annually for about a week, financed partly by the Staff Benefit Fund. Workers also go on excursions on their own initiative and the Administration helps them with advice and guidance. Travel widens the outlook and makes us better citizens and the most gratifying results have been achieved by sponsoring and encouraging such excursions which enlarge the mental horizon of the participants and bring them together in common brotherhood.

Monthly Outturn

	Target figures		Actual figures	
	K.D. coaches	Indigenous coaches	K.D. coaches	Indigenous coaches
April 1959	...	30	...	35
Cumulative total for the first month of the year 1959-1960.	...	30	...	35

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Travel of spindle	4"
Vertical adjustment of arm	27"
Range of spindle speeds 400/650/1,150/2,100	

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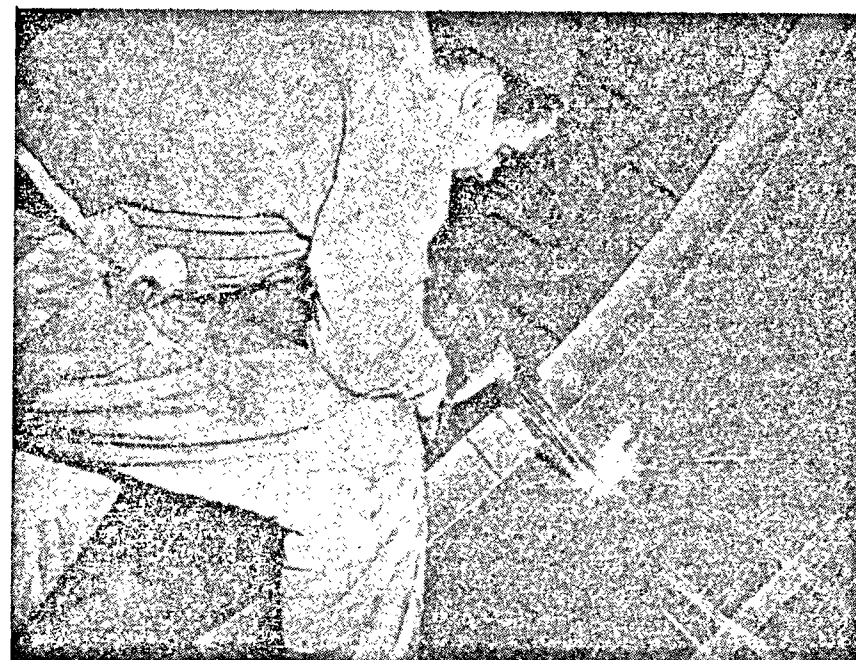
A NEW METHOD OF STUD WELDING WITH WELDING CARTRIDGES

BY

W. P. VAN DEN BLINK, E. H. ETTEMA AND P. C. VAN DER WILLIGEN

(Courtesy—The Philips Industrial and Electronic Bulletin, Vol. I, No. 2, September-October 1955)

(The number of studs welded every day is roughly estimated at over one million, and will certainly increase considerably during the next few years. The importance of an inexpensive and efficient stud welding process, as developed by the writers of the present article, will therefore be evident.)



Introduction

STUD welding may be defined as the welding of a rod-shaped object (pin, stud, bolt) to say, a plate, at right angles, without employing a separate welding electrode. It can be done by means of a resistance weld or by employing the stud itself as a welding electrode, that is, by drawing an arc between the stud and the work.

Steel studs joined to steel surfaces at right angles have a vast number of applications. Some examples are the securing of covers, the assembly of various parts of machines, flange connections, the fixing of facing material to a steel surface (say, wooden planking on a steel deck), or the anchoring of pipe brackets in ships and other steel constructions. The boiler-making industry offers another example, viz.,

the fixing of studs, in large numbers, to heat exchanger tubes, to increase the overall area of heat transfer.

Stud welding is much quicker and cheaper than the conventional method of fixing studs, that is, screwing threaded studs into drilled and tapped holes. Moreover, such holes, weaken the plates and may cause leaks, objections which apply equally to rivets. Hence it is not surprising that such methods are now being superseded more and more by various stud welding processes.

Resistance Welding :

In resistance welding, stud and workpiece are pressed together and a strong current is passed through them. The contact resistance between the two results in heat being generated at the point of contact, so that the material is softened. When the material is suitably plastic, the stud and the work are clamped together between the jaws of a press. How much of the cross-sectional area of the stud is actually welded depends upon the current and the pressure employed. The use of a press imposes certain limitations on the size and shape of the workpiece. On the other hand, this method of welding is better than others in that it does not form a collar of weld metal around the base of the stud (Fig. 1) ; this is an important advantage for some purposes (e.g., joining flanges).

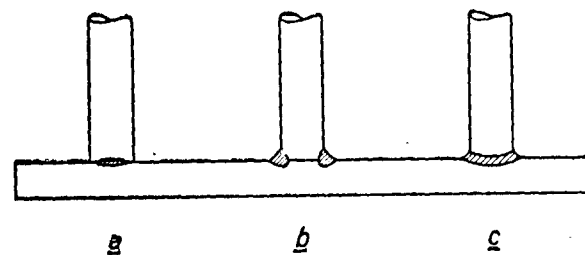


Fig. 1. Difference between the welds produced by the various methods of stud welding.

(a) Resistance weld (b) Arc weld produced with separate welding electrode (c) Weld produced by drawing an arc direct between stud and plate.

The conventional method of stud welding :

Studs can be welded, of course, with an ordinary welding electrode. Although this method generally produces a better joint, and is less limited in scope (e.g., as regards the size of the workpiece) than resistance welding, it requires much time and skill and is therefore rather expensive. In view of this fact, another method, that of drawing an arc direct between the stud and the work, was much used in the ship-building and boiler-making industries during the second world war. Usually, the stud is pressed against the work by a mechanism in the holder (or gun), the current is switched on, and a mechanism at once retracts the stud a fraction of an inch to draw the arc. After a pre-determined interval, in which a suitable amount of molten steel accumulates on the surface of the work and on the end of the stud, a separate unit connected to the gun switches the current off and releases a spring in the gun to press the stud into the molten steel.

For a half inch stud, the welding time is of the order of half second and the welding current 500-1000A. Frequently, and invariably in the case of vertical and overhead welding, a porcelain ring ("ferrule") is fitted round the base of the stud to minimise loss or spattering of the molten metal. When the stud is welded, this ring is broken off.

Although quite practicable, this method of stud welding has certain serious disadvantages, largely owing to the fact that the stud, also employed as the welding electrode, is bare ; D.C. has therefore to be used, and, since the currents are very heavy, an expensive rectifier is required.

Bare electrodes cannot be welded with alternating current of normal voltages (approx. 80V), since the arc would then be unstable and liable to extinguish prematurely. Moreover, without special precautions, electrodes not enclosed in a slag-forming coating produce welds of inferior quality. The precautions

referred to consist in employing studs made of a special type of steel, and in some cases, applying deoxidizing agents to the ends of them. It follows that, at least for many purposes, it is necessary to employ studs specially made to suit the particular welding conditions. Also, the equipment required to move the stud in the above mentioned manner and control the current is rather complex.

It will be evident, then, that the search for a simpler stud welding process is well worthwhile. The principles and application of a new method evolved as a result of this investigation will now be explained. Some measurements carried out to analyze the new process, and a number of tests on welds produced by it, will then be described. To conclude this article, one or two important practical details will be mentioned.

Principles of the new method :

In 1945, the Philips Laboratories at Eindhoven developed what is known as the contact arc welding process. It involves the use of welding electrodes whose coating is very thick, and is rendered semi-conductive by including in it an appreciable part of the weld metal as a powder. Such welding electrodes ignite and re-ignite very readily ; moreover, they are suitable for touch-welding. The new method of stud welding is based on the same principles as contact welding.

Let us now consider what happens when a partly used contact welding electrode, that is, one whose tip contains a deep "cup" formed during welding (Fig. 2), is applied to a workpiece and the voltage is switched on. The current then flowing through the cup to the workpiece builds up very rapidly, owing to breakdown effects between the individual grains of iron powder in the material forming the cup ; the grains fuse together and so produce a rapid drop in resistance. In a very short time, then, the temperature at the point of contact rises enough to strike an arc. Once

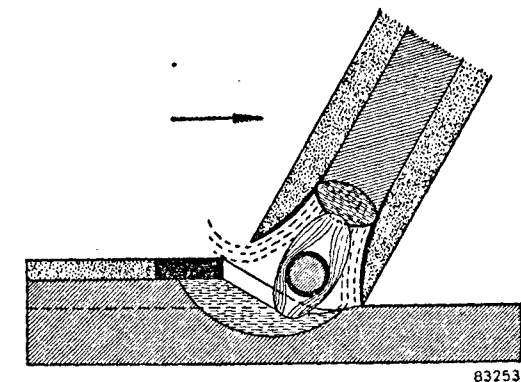


Fig. 2. A deep "cup" formed at the tip of a contact welding electrode during the deposition of metal, prevents the electrode from "freezing" to the work

formed, the cup remains intact throughout the time the electrode is fused, keeping the core wire at certain distance from the work and thus preventing the two from "freezing" together.

Now, if the entire coating of a contact welding electrode, other than a small portion at the tip, be stripped off, and if this electrode is then pressed against the workpiece at right angles (Fig. 3), the arc produced when the current is switched on will be quite normal at first ; however when the remaining portion of the coating is almost consumed, the core wire suddenly breaks through the cup and freezes to the weld metal. This is precisely

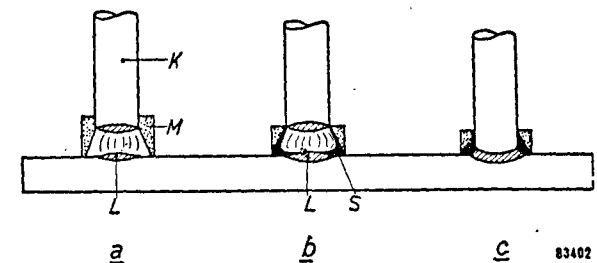


Fig. 3. The different stages in stud welding with a partially stripped contact welding electrode having a "cupped" tip. M portion of coating left on the rod. K core wire. L Molten pool of metal. S Slag. (a) Immediately after the striking of the arc (b) just before the electrode drops through the cup. The coating and the core wire have partly melted. A pool of molten metal and a certain amount of slag have been formed (c) After the electrode has dropped to the cup. The weld metal is covered with slag and the remnant of the cup around the weld helps to shape it.

what is required in stud welding. The fusion time of the electrode is governed by the dimensions and composition of the coating, as well as by the welding current.

The basic idea of the new method of stud welding is to make the "coating" separately in short sections, cup-shaped and similar in composition to the coating of the contact electrodes. Fitted to the end of a stud, such a section ("welding cartridge") would enable it to be welded in the same way as the stripped contact electrode described above. These ideas, after many experiments, have led to the simple method now to be described.

The new method of stud welding :

The shape of the welding cartridge

A diagram showing the welding cartridge, attached to a stud A, as placed on the work to which the stud is to be welded, is seen in Fig. 4.

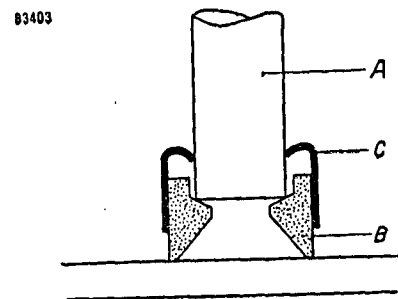


Fig. 4. The welding cartridge, comprising a semi-conductive igniter element B and a cardboard collar C to hold it on the stud to be welded A. During welding, the ridge of the igniter element supporting the stud melts, thus enabling the stud to be pressed into the pool of molten metal.

The cartridge is in two parts, viz., an igniter element B, made of semi-conductive material, and a cardboard collar C, fitted round the igniter. The igniter has a cup-shaped cavity similar to that acquired by a contact welding electrode, and an inside ridge to support the stud to be welded. One or two studs (half inch), together with the associated welding cartridges, will be seen in Fig. 5. The welding

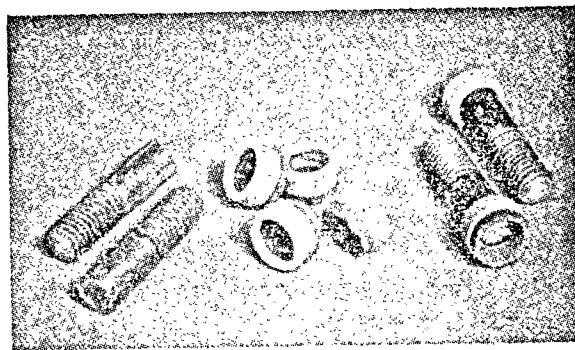


Fig. 5. Threaded Studs ($\frac{1}{2}$ inch) and the corresponding welding cartridges. Two studs with cartridges fitted are shown on the right of the picture.

process is very much the same as that of the stripped contact electrode already described. The heat generated by the arc melts the igniter from the inside: when the supporting ridge has melted away, the stud (which is under a certain pressure) shoots into the molten weld metal. The arc is shorted and the stud "freezes" to the work. Whilst the inside of the igniter is melting, its outside remains intact, thus keeping the arc length more or less constant until the stud breaks through the cup.

The cardboard collar serves two purposes. Firstly, it prevents the rather brittle semi-conductive material of the igniter from disintegrating too soon during the welding process and thus shortening the welding time unduly. Secondly, it holds the welding cartridge on the stud. To enable it to do so, the top edge is curled inwards to fit fairly tightly round the stud. The cardboard is stiff enough to prevent the cartridge from slipping off during handling of the stud.

The use of a cardboard collar is possible by virtue of the fact that the heat generated during the burning of the arc (about 0.5 sec.) does not reach the outside of the igniter until the stud is welded. The cardboard, having served its purpose, then catches fire.

The composition of the welding cartridge

The first experiments were carried out with welding cartridges similar in composition to the coating of a contact electrode. However, it was found that very much stricter requirements as regards freedom from gas and non-sensitivity to moisture must be imposed on the igniter than on the coating of welding electrodes, owing to the fact that no after-heating occurs as is necessarily the case in normal arc welding; the weld metal therefore sets very quickly. Consequently, the probability that any gas occluded in the metal will be able to escape is very much smaller than in ordinary arc welding. The requirements that the igniters be free from gas necessitates heating them during manufacture to a temperature higher than normal for welding electrodes (baking). This must be done in a neutral or reducing atmosphere, to avoid oxidation of the metal powders in the material.

Experiments with different coating-constituents have shown that a low melting point should be avoided. This is not surprising, in view of the fact that the stud is released as soon as the supporting ridge in the igniter melts. If the igniter has a very much lower melting point than the stud, the latter will be released before the end of it is fully molten, and therefore pressed into the welding-pool prematurely.

However, it was found that an igniter, composed partly of titanium dioxide (TiO_2) and partly of binding agents, deoxidising metals, and so on, meets all the requirements imposed by this method of welding. The desired conductivity is not obtained by including a certain amount of iron powder, as in contact electrodes. Instead, since the igniter must be baked in a neutral or reducing atmosphere, we take advantage of a well-known characteristic of TiO_2 , that is that in a reducing atmosphere it loses part of its oxygen content and in the process becomes somewhat conductive (semi-conductive). Since

the conductivity thus imparted to TiO_2 , depends upon the degree of reduction attained under the particular baking conditions, it can be regulated accurately within certain limits. The actual conductivity of the igniter is very critical; if it is too low, the arc will not strike, and if it is too high, too much of the welding current passes through the igniter, causing it to melt prematurely.

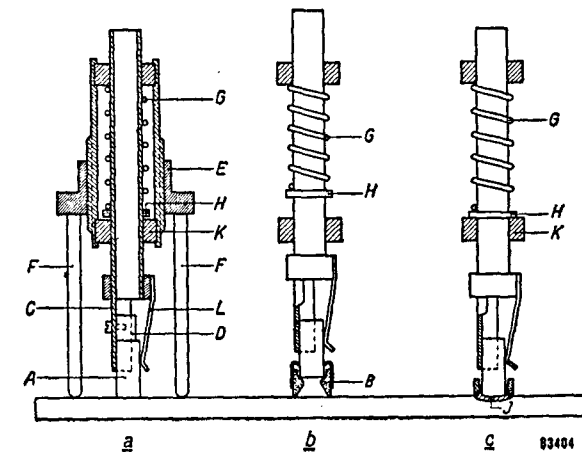


Fig. 6 Diagram to demonstrate the operation of the welding gun.

- The stud A is clamped in a stud holder C by a flat spring L and rests against a stop D, adjustable to different stud-lengths (coarse adjustment). A threaded ring E (fine adjustment) enables the bottom face of the stud to be adjusted to a level about 0.5 mm beyond the plane passing through the ends of the supports F. This can be done with the aid of a simple jig, e.g., a flat plate about 0.5 mm thick with a hole, somewhat larger in diameter than the stud, at the centre; this plate is so positioned against the supports that the end of the stud just enters the hole. A spring G presses the stud on the workpiece.
- A welding cartridge B is fitted on the stud. As the gun is dressed against the workpiece, collar H is pushed upwards, thus compressing spring G. The current is then switched on and an arc is struck. When the part of the igniter supporting the stud melts, the stud is pressed on to the workpiece by spring G.
- When once the stud is welded, collar H rests on stop K; this ensures that each stud is pressed equally far into the molten pool of metal. The amount of "excess" weld metal at J depends upon the distance to which the stud originally protrudes (0.5 mm).

The Welding Gun :

In principle, welding with the cartridges described here can be carried out by clamping the stud in a holder (very similar to the type employed in ordinary welding) and pressing it against the work, the welding current then being supplied through the holder. In practice, however, this method has serious objections :

- (1) It is impossible to place the studs really squarely on the work by hand.
- (2) When a number of studs of equal length are to be welded it is very difficult to get them all at exactly the same height, since some of the studs are pressed deeper into the molten pool than others.
- (3) In the welding of studs the current cannot be switched on and off simply by moving the holder on to or off the work as in normal hand welding.

To avoid these difficulties, it was necessary to design a special holder, or welding gun. The principle of this device is shown in Fig. 6 and its operation explained in the caption.

The stud welding procedure is as follows. The studs to be welded are inserted in the welding gun, which is then adjusted to suit the particular stud length. When a number of studs of the same length (tolerance, say, ± 0.2 mm) are to be welded, only this first adjustment is, of course, necessary. Next, a welding cartridge is fitted on the stud, the gun (roughly 0.5 sec.) is extinguished and the weld is applied to the appropriate spot on the workpiece and pressed firmly against it. The current is then switched on by means of a switch built into the pistol grip. When the arc operating period is completed, the switch is released, cutting off the short-circuit current. The welding gun is then retracted from the work and the fragments of the welding cartridge are removed from the stud. The interval between switching on and switching off is roughly 2

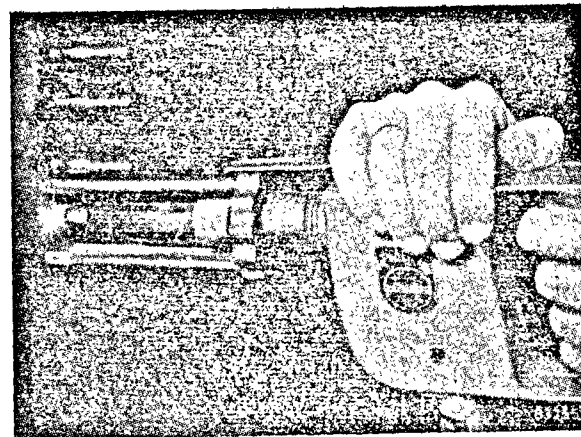


Fig. 7. Welding a $\frac{3}{8}$ inch stud to a vertical wall by the new method with a welding cartridge.

sec. Fig. 7 shows the welding gun, with stud and cartridge fitted, being used to weld a stud to a vertical plate. Fig. 8 is the circuit diagram.

Comparison of the new technique with the conventional method :

Comparing the new method of stud welding with the one usually employed hitherto, we see that disadvantages associated with the latter are now eliminated. Firstly, the new method incorporates all the advantages of coated, as compared with bare welding electrodes. Amongst other things, the coating serves a metallurgical purpose (that is, not only in producing slag to react with the molten metal and the impurities in it, but also in introducing alloying constituents into the weld), thus enabling studs of ordinary commercial steel to be employed ; hence it is no longer necessary to employ studs made of special steels. Another important task of the coating is to reduce the amount of nitrogen absorbed from the atmosphere. Filing tests on welded joints have shown that hardness owing to the formation of nitrides in the weld is very much less noticeable in the new, than in the old process. Moreover, the coating also contains substances which emit electrons readily when heated, thus stabilizing the arc. This arc stabilization

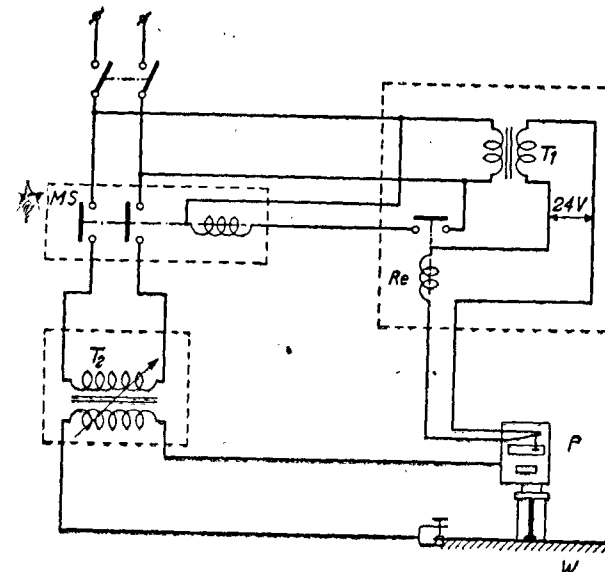


Fig. 8. Circuit of the electrical equipment employed in the new stud welding process with welding cartridges. This process enables alternating current to be used, which means that ordinary welding transformers (open circuit voltage roughly 75 V) can be employed. A micro-switch built into the grip of the welding gun P operates the coil of a relay Re. Since the energising voltage of this relay is only 24 V (transformer T1), the micro-switch can be touched without risk, even when defective. The relay operates a magnetic switch MS controlling the welding transformer T2. W is the workpiece to which the stud is to be welded.

enables low-frequency (say, mains-frequency) alternating current, and a relatively low voltage, to be employed. The advantages of A.C. welding (inexpensive welding equipment, less arc "blow") need not be pursued further here.

Secondly, the welding cartridge itself strikes the arc and keeps the length of it constant throughout the welding period. Also it automatically leaves a clear path between stud and work at the end of the prescribed arc period. Accordingly, no special means have to be built into the welding gun and the associated equipment to achieve this behaviour. The equipment is therefore relatively simple and inexpensive. It will be seen from Fig. 8 that apart from a simple mechanism to grip the

stud and press it home, the welding gun itself contains only one switch. The associated equipment, apart from the welding transformer T2, includes only a relay Re with a transformer T1, (both housed in the same box) and a magnetic switch MS.

Properties of the Weld :

Since the greater part of the weld metal comes from the stud and the plate, the properties and composition of the weld are governed partly by the composition of these components. However, deoxidizing agents incorporated in the igniter ensure that the weld metal solidifies as "killed" steel¹ (Fig. 9).

The process described here is intended primarily for the welding of studs to unalloyed steel (C-content roughly 0.2%). Depending on the particular requirements to be met by the weld, it is advisable with hardening types of steel to preheat the parts to be welded, in order to reduce the cooling rate and hence limit the hardening.

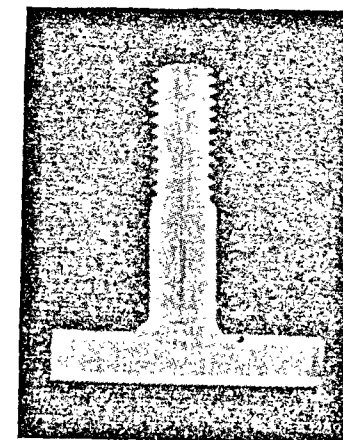


Fig. 9. Cross-section of a $\frac{3}{8}$ inch stud welded to a plate by the cartridge method of stud welding. The slag enclosures revealed by etching show that the stud and the plate are both made of rimmed steel.

¹ "Killed" steel is steel which generates very little gas when it sets after casting. The gas generated during the setting of rimmed steel causes segregations and porosity.

The simplest method of testing the strength of the weld is to bend the stud, say, by hitting it with a hammer. Experience has shown that a stud of mild steel can be bent in this way to an angle of 90° without cracking (Fig. 10). With studs or plates of more brittle materials the plastic deformation possible is less.

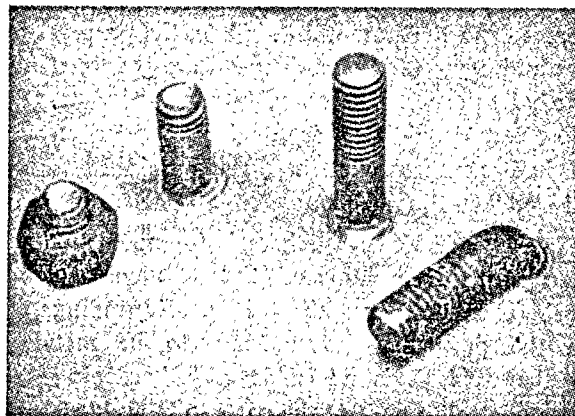


Fig. 10. Simple tests to determine the mechanical strength of the joint between stud and work. Right : A stud bent through 90° by hammering. Left : A stud sheared off by turning a nut against a metal sleeve, (not shown in the photograph) fitted round the stud. The part of the stud broken off with the nut still on it is seen on the extreme left of the picture.

Another simple test is to shear off a partly threaded stud by fitting a short metal sleeve round the welded stud, screwing a nut on the stud and tightening it against the sleeve. If the nut is turned far enough, the stud ultimately breaks. With a stud and a plate of mild steel, the weld itself will invariably remain intact and the stud will break where it is threaded, that is, unless the thread itself is sheared off (Fig. 10).

Studs without thread can also be subjected to tensile tests by welding two of them end to end to opposite sides of a plate and testing this assembly on a tensile machine. As in the other test, the weld itself normally remains intact and fracture occurs in another part of the assembly (Fig. 11a).

In a similar way, fatigue tests can be carried out. A series of test pieces, pre-stressed under

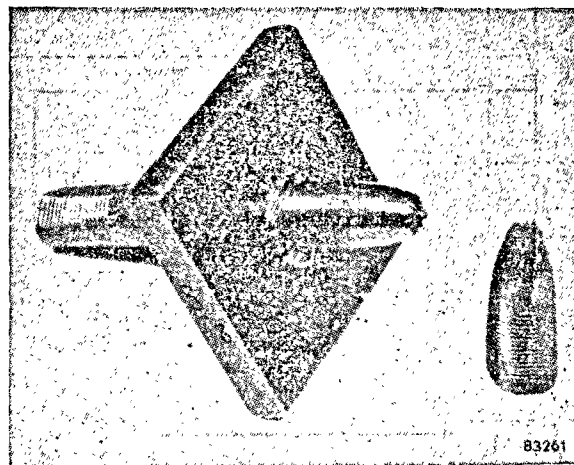


Fig. 11-a. Result of a tensile test on two studs welded end to end to opposite sides of a plate.

a tension of 0.25 kg/mm^2 (0.16 tons/in^2), were subjected to alternating stresses of amplitude varying, as between the different tests, from 10 to 20 kg/mm^2 ($6\frac{1}{2}$ — 13 tons/in^2); for practical reasons, the studs used were threaded. These test pieces also fractured in the thread, that is, clear of the weld (Fig. 11b). The fatigue limit of mild steel studs was found to lie in the region of 15 kg/mm^2 (10 tons/in^2).

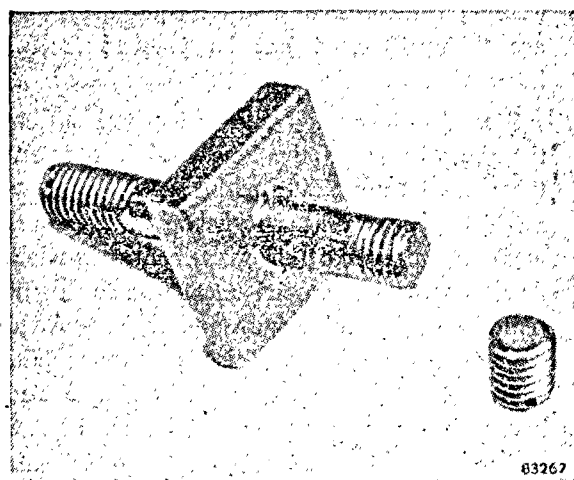


Fig. 11-b. Result of a fatigue test

Some practical details :

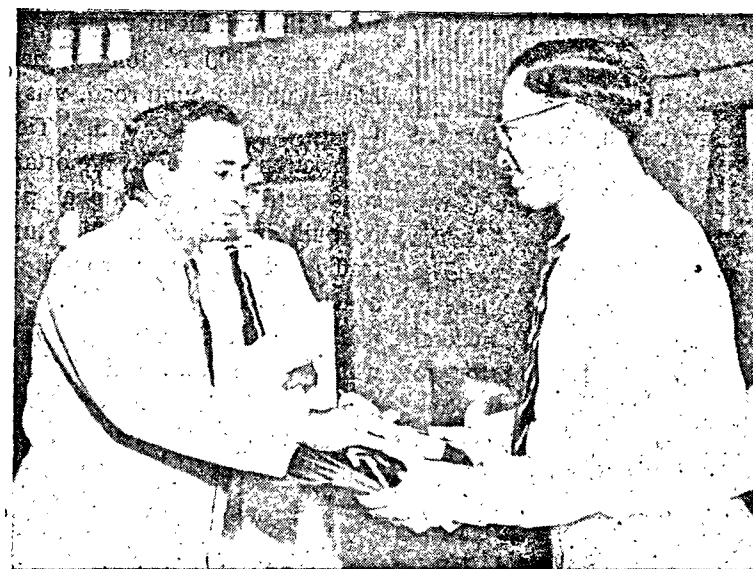
Welding cartridges are now made to fit four stud diameters, viz., $1/2"$, $3/8"$, $5/16"$ and $1/4"$. The tolerance on the $1/2"$ studs is $+0.3 \text{ mm.}$ and that on the others $+0.2 \text{ mm.}$; if the stud is too thin it will drop through the cartridge too soon, thus shortening the welding time unduly, and if it is too thick the welding time will be too long.

With an ordinary welding transformer, the current settings required for the four stud diameters specified above are 750, 500, 450 and 325-A, respectively. These values apply to welding on relatively thick plates. For thin

plates (thinner than about half the stud diameter), the above values should be reduced.

The open-circuit voltage of the welding transformer should be at least 70V. As we have already remarked in connection with hardening effects, the requirements imposed on the steel to be welded and the material of the stud are not very stringent. Excessive slag enclosures should be avoided, since they may make the weld unduly porous. However, the sulphur content, for example, need not be particularly small, and provided that the weld is not required to be above average toughness, sulphur alloyed free-cutting steel can also be welded by this technique,

A Philips stud welding equipment was formally presented to Shri M. Lal, Principal, Technical Training School, by Shri V. T. R. Chandran, Regional Manager of M/s Philips India Ltd. at a function arranged at their Show Room. The Welding set was a presentation by M/s Philips to the Technical Training School where hundreds of welders are being trained.



NEWS FROM SWITZERLAND

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

New article to new Swiss vehicle

A Swiss firm manufacturing tractors has studied and perfected a vehicle which can be used for all types of ground. The new system consists in having recourse to three axle-trees, which makes it possible for the vehicle to be articulated vertically in its centre. Thus, each of the halves of the vehicle can, at will, gain support from the other by means of a hydraulic device, which, when operated by the driver, raises or lowers the front or the back of the machine. Should it be faced by an obstacle—such as a wall—the front part of the vehicle is raised until it can rest on the top of the obstacle, after which it clears it by means of its front traction, in the same way as do all the other “all-grounds” machines. This exceptional flexibility also makes it possible for the vehicle to adhere to the ground with all its wheels, even when the ground is very uneven. This utility machine, which is superior to caterpillar tractors, can also travel easily in a liquid element, as the engine can be raised above the water level. Rivers, therefore, do not constitute any obstacle for this extraordinary machine.

Ambitious plans in Zurich

An organising committee has been founded in Zurich with the aim of erecting a tower, 540 feet high, in the proximity of the centre of the town, on the bank of the lake, to serve as a public attraction and a belvedere. The plans have been drawn up by an engineer, Mr. Dunkel, who is a professor at the Federal School of Technology and who, prior to making his choice, spent a long time prospecting the Zurich territory, from aboard a helicopter. The tower will be formed by three parallel

pillars, made out of a light metal, forming a triangle of 70 feet on each side at the base and joined together by means of panoramic terraces. A restaurant capable of accommodating 200 persons is to be installed in the tower, at a height of 305 feet. The lifts will be placed in a tube, set up in the centre of the tower. This project, the cost of which has been estimated at \$U.S.A. 1,280,000 is to be carried out entirely by private initiative.

Garbage disposal

The English town of Salford recently sent a ton of household garbage to Switzerland, where it was transformed into bricks, in the plant for the destruction of garbage in Basle. This was done in order that the British municipality, which is anxious to solve the problem of the destruction of garbage, might see for itself, by means of this experiment, what was really the value of the Swiss machines which transform sewage into briquettes that can be used, at choice, either as smokeless fuel or as fertilisers.

Roads through the mountains

A new 4900 ft. long tunnel, Switzerland's longest underground road, was recently inaugurated in the Blenio Valley, Ticino. This new connection will be an important help for the construction of additional power-plants to be built in this area. The tunnel will allow traffic all the year round, unaffected by avalanches and snow drifts. One interesting feature of this new road tunnel is its ventilation which works automatically according to the contents of waste gases. If the ventilation failed, two traffic lights at both entrances would immediately stop all cars.

THE DOYEN OF 20th CENTURY ARCHITECTURE

(Frank Lloyd Wright, the doyen of 20th century architecture, died on April 10, 1959 at 89 in Phoenix, Arizona. A genius, his lofty ego had its share of bouquets and brickbats so that opinion about him ranged from calling him ‘cantankerous’ to ‘perfectionist’. However, the man who said “music and architecture blossom on the same stem—sublimated mathematics”, made his architecture a real blend of poetry and pragmatism. The following article surveys his important contributions to a field he raised to great heights).

About three years back, more than six decades after he first blue-printed the buildings that unshackled architecture from the Greco-Gothic tradition, Frank Lloyd Wright, the world's most honoured architect, witnessed the completion of his first skyscraper. It is the slender, 19-storey Price Tower in Bartlesville, Oklahoma, a small prairie city of less than 25,000 population.

Wright's new tower—the first skyscraper ever to be built in the American countryside—is the realization of an idea about cantilever type construction for tall buildings that had been in his mind ever since he designed the famous earthquakeproof Imperial Hotel in Japan in 1917.

Many years passed by while the master builder busied himself with other projects which have attracted world-wide interest. But the idea of a unique type of tall building remained in the background of his mind.

Finally, in 1952, a man named Harold C. Price, who had built up a small welding shop in his home town of Bartlesville, Oklahoma, into one of the nation's biggest pipeline construction companies, began thinking about the needs of his company for a new office building. In seeking to realize his ideas, Price eventually sought out Wright's help.

Wright had the idea of such a skyscraper construction, and Price wanted an office building that would be beautiful as well have

functional efficiency. But the question was: “Why a skyscraper in a small western town?” Wright's answers to this popular question ran true to form—both sociological and aesthetic.

One of them stemmed from Wright's lifelong appreciation for the beauty in nature. He compared Price Tower with a tree that had escaped from the crowded forest. He pointed out that just as the full and natural beauty of a single tree was seen when the tree stood alone rather than packed into a forest, so it should be with a skyscraper.

Another answer evolved around Wright's intense dislike for big cities. Here is what he had to say about the sociological and aesthetic aspects of Price Tower in an article he wrote for the Architectural Record magazine:

“This gentle skyscraper,” Wright wrote, “has escaped the big city to live in an American town in the country.....to stand there in its own park, casting its own shadow upon its own ground. Reflected in a long slender pool, it affords everyone everywhere in it a beautiful view of the rolling countryside that is Oklahoma.

“The American skyscraper belongs, rather, to our smaller American towns like Bartlesville, where there is still chance for the spirit of man to live and express itself in a free community that offers a better future to American democ-

BIGGEST BIRTHDAY PRESENT

One of the biggest birthday packages on record was received by Brazil's Companhia Paulista de Estradas de Ferro recently in honour of the railroad's ninetieth anniversary. Inside a plastic wrapping—complete with red bow and birthday greeting card—was a 68 ton, diesel-electric locomotive, sent by General Electric (U.S.A.). The railroad was founded during the war with Paraguay in 1868 and nearly all the capital for starting the company was raised within the country—the biggest project ever undertaken without the aid of foreign capital up to that time. During all the years of its life, the Paulista has paid dividends—a feat rare in the history of railroads.

—GLOBE PRESS SERVICE

facy. The big city of today is servile and doomed by the eternal law of change."

In its design, the building is much like a tree also. With its cantilever construction suspending the floors out like limbs from four vertical steel-reinforced concrete columns that also function as interior separating walls, all activity in the Tower flows upward and outward from the bottom and centre of the building.

An architectural heretic from the outset of his career, Wright had long been the object of fierce controversy, alternately attacked and acclaimed. Today his place as one of the greatest architects of the Twentieth Century is assured.

Wright won recognition in Europe before he had any support in the United States, but in later years, awards, citations, and honorary degrees were showered upon him by his own country.

In a lifetime dedicated to architecture Wright executed some 800 buildings ranging from houses to hotels, to skyscrapers and places of worship, many of them among the world's most beautiful and most startling. Currently under construction and nearing completion is New York's first Wright building—a museum that promises to be as original as anything he has ever done.

The museum, conceived by Wright as "a little temple in a park," will be the new home for the art treasures collected by the late mining magnate Solomon R. Guggenheim, and will be dedicated to his memory. The cylindrical building will be six stories high, with a hollow centre that will be the core for a ramp three-quarters of a mile long, gently spiraling from bottom to top, and constituting one uninterrupted gallery. The unbroken wall beside the ramp, built at a slight, almost imperceptible, angle, will display pictures as if on an easel, with the overhead daylight falling

directly upon them. Elevators will make it possible for visitors to enter or leave the gallery at any level they choose.

In building all his houses Wright showed a strong preference for using wood and stone undisguised by paint or plaster. He insisted that homes be built "organically," "from within outward," following a design that expresses the individual character of the life to be lived in them. And he showed an almost uncanny gift for fitting houses into their natural settings.

Though his public buildings have sometimes flouted all accepted architectural standards, they have proved surprisingly practical and durable. Frequently, because of their unconventionality, they have had to undergo extraordinary tests. For instance, when the mushroom-shaped columns that support one of his office buildings in Racine, Wisconsin, were suspected of being unsafe, Wright called for a public demonstration to prove their strength. One of them was set up in a field and a steam shovel loaded its pancake-like top with sand. It failed to crack even when the weight reached 60 tons.

Born at Richland Centre, Wisconsin, June 8, 1869, Wright entered the University of Wisconsin but left it without graduating and at 18 went to Chicago to join one of the city's foremost architects. Here he entered the offices of Adler and Sullivan, then the most progressive architectural firm in America. This was a fortunate connection, for Louis Sullivan was a gifted architectural pioneer, one of the first to build the slab-like office buildings that would become the prototype of the modern skyscraper.

In 1911 he built his own dearly loved home near Spring Green, Wisconsin. He called it "Taliesin," meaning "shining brow" in Welsh, because it was built like a brow on the edge of an oak-studded hill.

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

Wright's most notable public undertaking in this period was the Imperial Hotel of Tokyo, completed in 1922. It presented unusual difficulty, for it had to be able to withstand earthquakes. He solved the problem through a unique use of concrete supports, cantilevered floors, and a foundation floating on a jelly-like cushion of mud. His engineering skill was fully vindicated when the hotel survived the disastrous earthquake of 1923 without damage.

His reputation soared in the late 1930's with the creation of two of his most notable buildings. One of them, the Kaufmann House at Bear Run, Pennsylvania, is considered the most beautiful of all his houses. It is called "Falling Water" because it is cantilevered over a natural waterfall. The other structure is the administration building of the S. C. Johnson and Son Company of Racine, Wisconsin, with its streamlined exterior of brick walls broken only by horizontal bands of glass, and the celebrated mushroom columns of its interior.

It was said that Wright already had changed the course of contemporary architecture not once but twice. He fathered an entire movement at the turn of the century, based on the maxim that "form follows function"; and at the fag end of his life he again took architecture into a new world of form, letting "space in motion" mould his structural patterns, as it does in the remarkable house he designed for his son David in recent years, and will do in New York's new museum.

Wright always viewed life as a perpetual adventure. Talking to Relman Morin, the Associated Press reporter, a few years back, he said that after fighting a lifetime against contemporary trends he felt a little nervous for fear that he might be with the current. "It has turned," Wright said, "and I am a little afraid of going downstream when, all my life, I have been going upstream."

This statement succinctly sums up his philosophy of life. Till the last moment of his life he lived it down.

VISITORS TO THE FACTORY

An Iraqi Railway delegation headed by General Salih Zaki Tawfiq, Director-General of Iraq Railways, Baghdad, accompanied by Shri M. S. Murty, Chief Mechanical Engineer of the Chittaranjan Locomotive Works, visited the Integral Coach Factory on the afternoon of the 28th April 1959. In the absence of Shri K. Swarup, Chief Mechanical Engineer, the delegation was, on arrival, received by Shri C. G. Deṽaya, Deputy Chief Mechanical Engineer, and were shown round the workshops and the Basic Training Centre of the factory. At the conclusion of the visit, the leader of the delegation was presented with a model coach as a memento of their visit to the factory. The leader and members of the delegation recorded their impressions in the Visitors' Book as follows :

General Salih Zaki Tawfiq :

"Excellent factory, highly organized. I congratulate you from my deep heart and thank you."

Mr. Mohamed A. Hussain of Iraqi Republican Railways :

"Congratulations on a neat and efficient layout."

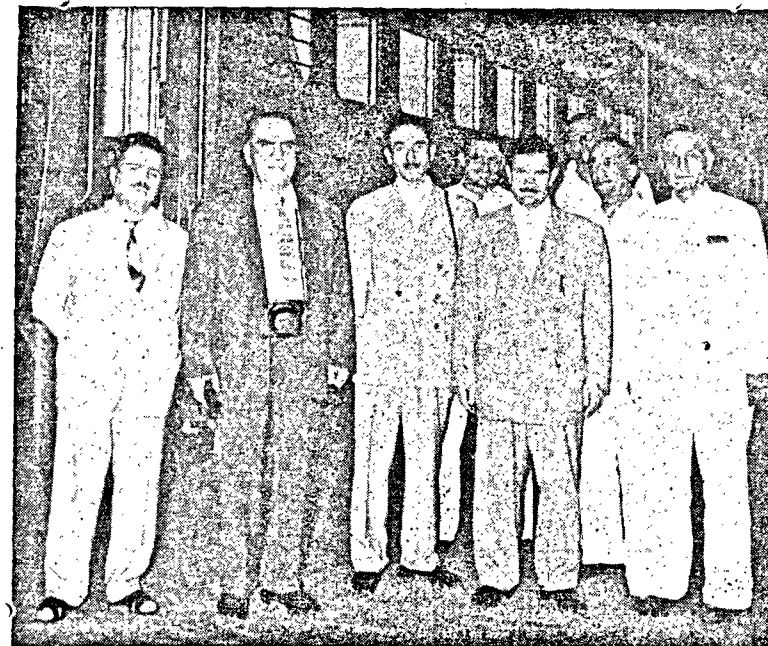
Mr. Mohamed Haba of Iraqi Republican Railways :

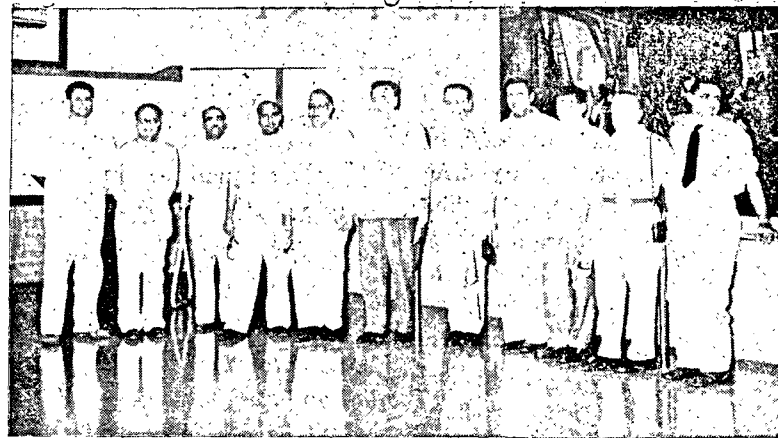
"I have seen many factories in America, Europe and Asia and I have found yours the best. Congratulations."

Mr. Rifaie Hadid of Iraqi Republican Railways :

"Highly impressed with the well developed and accurately precise work compared

The Iraqi Railway delegation led by General Salih Zaki Tawfiq.
(second from left)





H. E. Mr. Trampczynski, Polish Minister for Foreign Trade (sixth from left), who visited the factory on 29-4-1959.

MK LATHE ATTRACTS BIG CROWDS AT SINGAPORE EXHIBITION

The Foreign Officer of the Engineering Export Promotion Council stationed at Singapore reported recently that the MK Harihar MB Lathe displayed at the Indian Pavilion in the Exhibition organised by the Singapore Chinese Chamber of Commerce created great interest among the visitors and that this machine was constantly surrounded by admiring crowds throughout the period of Exhibition. This Exhibition was organised some weeks back to celebrate the Independence of Singapore.

with what have been seen all around the globe."

His Excellency Mr. Trampczynski, Polish Minister for Foreign Trade, visited the factory on the afternoon of the 29th April 1959. In the absence of Shri K. Swarup, Chief Mechanical Engineer, the Polish Minister was received by Shri M. Sundar Raj, Deputy Financial Adviser and Chief Accounts Officer and shown round the workshops and the Basic Training Centre of the factory. At the conclusion of the visit His Excellency remarked that it was "an excellent factory, well organised, with big prospects."

Mr. Moinul Haque Choudhury, Minister for Agriculture, Assam State, accompanied by Shrimathi Choudhury, visited the factory on the afternoon of the 30th April 1959. He was received and shown round the workshops of the factory. Mr. Choudhury had already visited the factory in July last year and said at the conclusion of his visit that "the progress" that had been made since he last visited "was really worthy."

DIESEL ELECTRICS FOR ROURKELA

A vital role in helping India reach the modern steel age is being played by a fleet of General Electric (U.S.A.) diesel-electric industrial haulage locomotives at the recently commissioned Hindustan Steel Limited Rourkela installation.

Twenty-four G-E industrial haulage type locomotives (10 each of 80 and 35 tons, and four of 115 tons) have been obtained by the state-owned Hindustan Steel Limited from International General Electric Company (India) Private Ltd., for the West German-built Rourkela (Orissa) works.

On completion, the Rourkela unit will produce between one million and 1.3 million tons of crude steel to be rolled into 720,000 tons of plate sheets and strips annually. Ultimate expansion of capacity is stated to reach two million tons.

Sometime ago, an advance fleet of ten G-E diesel electrics, part of the total order of 24 for Hindustan Steel at Rourkela, were assembled and kept in readiness at the King George's Docks, Calcutta, for their onward journey to Rourkela to take a notable place in furthering India's industrial revolution.

In this connection, IGE in India has maintained for many years an adequate staff of U.S. factory-trained Indian engineers and technicians for servicing G-E diesel-electrics in operation on industrial projects and the Indian Railways.

India urgently requires additional steel to further her industrialization plans. Although rich in iron, manganese, coal and limestone resources, India's total steel-making capacity previously reached only ten pounds per capita from the production of her three steel mills—all in the private sector. In the United States it is 1,700 pounds per capita.

A production target of six million tons (about 4.5 million tons of saleable steel) has been set for the end of the Second Five-Year Plan (1960-61). This includes 2,029,000 tons as the target for the three Hindustan Steel Limited public sector plants.

One of the biggest tasks in running a big steel plant is providing sufficient and quick railway transport for materials needed daily—both to the installation from outside and within the project itself.

According to Mr. J. S. Mathur, Chief Operating Superintendent of India's South Eastern Railway, a million-ton capacity steel plant needs about 12 trainloads of material daily—*Globe Press Service*.

RAILWAY SERVICE COMMISSION

MADRAS

CHANGE OF ADDRESS

The Office of the Railway Service Commission, Madras will be shifted to **No. 16/31, Eldams Road, Teynampet, Madras 18** on and from **1-6-1959**. New Telephone No. will be **72111**.



The first meeting of the Production Committee of shop 16 was held on the 25th March 1959. The proceedings at the meeting have been fully reported in the April '59 issue of "Railcoach". The main object of forming this committee is for discussion of ways and means of improving the quality and quantum of production. Frequent meetings of such committees will help the growth of efficiency.

SUMMER IN MADRAS

BY

MRS. MYTHILI

Clerk, C.M.E's Office

The sun is shining bright overhead,
The air is very still and dead ;
The tar on the street is like molten lead,
Yet we can find the streets overcrowded.

The traffic is of a large variety,
The streets appear to overflow with gaiety ;
Some people are going to worship the Deity,
Others are drawn by the entertainments of
the City.

An unlucky man is drawing a rickshaw,
The sweat is running down his jaw ;
You can see his customer, the haughty Shah,
Ordering him pitilessly to quickly draw.

The rich fly comfortably in cars,
And enjoy cool drinks in air-conditioned bars ;
Alas ! the poor can drink only from mud jars,
Content with a sip of water, instead of bars.

The fans in the office are at full speed,
Answering loyally to the staff's need ;
To the heat the clerks pay no heed,
But are occupied with the files indeed.

On every table a glass you can find ;
Taking drinks between work, you should not
mind ;
For a sip of cold water refreshes the mind,
And eases work of any kind.

The school-going children their faces flushed,
Are hurrying along by each other pushed ;
Their hair shining and smartly brushed,
They rush gaily to be in their classes hushed.

The old and the withered group to the park
goes,
To take rest and forget woes ;
The " mali " is seen watering with a hose,
Infusing life into a dying rose.

The majority of the city is collected on the
beach,
Unwilling to go home, they stick to it like a
leech ;
The children are seen sucking an ice each,
And are trying for the beautiful sun to reach.

The terribly hot day has come to an end,
All start for home, foe and friend ;
They have their household duties to attend,
Tired and wasted, to their beds for rest bend.

ERRATUM

In the article "I.C.F. BEATS PRODUCTION TARGETS" published on page 9 of the April, 1959 issue of "Railcoach", the words "smaller shell" appearing in line 9 of column 2 should read "similar shell". The error is regretted.

—Editor

Brain teasers

1. What is that number which when multiplied by each of the figures of the arithmetical progression 3, 6, 9, etc., give all results composed of three repetitions of the same figure?

2. From a point 'P' inside an equilateral triangle ABC perpendiculars PL, PM and PN are drawn to each side. What is the probability that a triangle can be drawn having the segments of the lengths PL, PM and PN as sides?

3. In order to encourage his son in the study of Algebra a father agrees to pay his son 8 Naye paise for every problem correctly solved but the son should give him 5 Naye paise for each incorrect solution. After doing 26 problems neither owes to the other. How many problems were correctly solved?

4. The ages of three daughters Eena, Meena, Deeka of Professor Maka were set as a problem by the professor to his students. The problem read as—The sum of the products of Eena's age, and Meena's age, of Meena's age and Deeka's age, and of Deeka's age and Eena's age exceeds by 37 the corresponding total last year. The sum is also equal to what the square of Eena's age will be next year. How old is Eena?

5. Add to each of these thirteen four letter words two letters and so form a new word. You are to use different letters for each word so that at the end you will have exhausted the twenty-six letters of the alphabet.

TOIL, MALE, AUNT, LATE, IRON,
MARE, TAPE, TINY, FIFE, RAID,
NOSE, HOLE and YEAR.

6. The Valley of Sukha Khet consisted of partly grasslands, the rest being sandy soil. If one-third of sandy soil turned grassy, one-fourth of grassland turned sandy, there would have been an equal extent of each. How much was actually under grass?

Solutions to last month's teasers :

1. Santlal is more shrewd. Sequira has a slight advantage if he bets even money on throwing a twelve in 25 throws.

2. The shopkeeper could have been advised to purchase either one in each of 1, 3, 9 and 27 kilograms costing a total of Rs. Six or four numbers of 4 kilogram weights and one in each of 1 and 3 kilograms costing the same Rs. Six.

3. Naming the cars in the first group going towards Koyalpur as A, B and C with A leading and those coming in the opposite direction as D, E and F with D leading ; the car A had gone in the lane while D, E and F pass the lane to let car A back up and proceed forward and the same operation is repeated for cars B and C.

4. i-b, ii-c, iii-d, iv-a, v-c, vi-d, vii-b, viii-e, ix-a, x-f, xi-g, xii-e, xiii-h, xiv-h, xv-f and xvi-g.

5. The judge put his own elephant with the 15, then gave $\frac{1}{2}$ of 16 (i.e. 8) to the eldest, $\frac{1}{4}$ th, $\frac{1}{8}$ th and $\frac{1}{16}$ th of 16 respectively to other sons and finally took back his own. $(8 + 4 + 2 + 1) + 1 = 16$.

6. The person addressing the boy is his mother.

Wit and Whistle

1. The American was wandering aimlessly in a lonely road in Scotland and at last met another human—a Highlander.

"Oh! please excuse me," said the American. "I am lost. Won't you show me some way."

"Are you wanted anywhere?" was the question from the Scotch.

"Why, no."

"Well, then, you are still lost," said the Scotch walking on.

2. The three Scotchmen were planning very seriously. The problem was how to avoid the collection plate in the church. Further, the minister had made a strong appeal

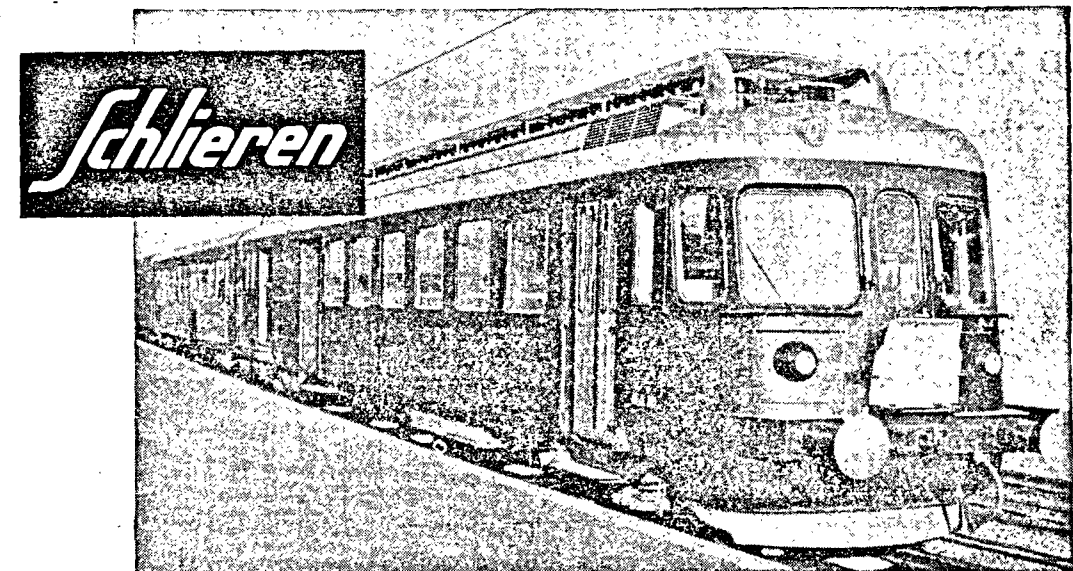
and had decided to collect at least a few dollars more for a worthy cause.

After an hour's serious thinking, the little fellow among the three said,

"Look ye telle's 'en the plate nears me, I'll faint an' ye two fella's carry me out."

3. Abraham Lincoln was once caught in a discussion, the subject being as to how long a man's legs should be. Obviously, the group was referring to the short man in the group, Mr. Douglas, a good friend of Lincoln.

When it became Lincoln's turn, everybody was very anxious to hear his comment. He said "Well. I think a man's legs should be long enough as to reach from his body on to the ground."



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

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

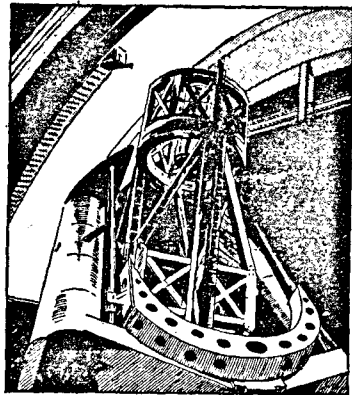
Swiss Car and Elevator Manufacturing Corp., Ltd., Schlieren-Zürich (Switzerland)



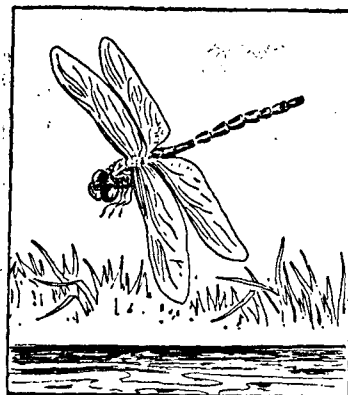
Group photograph of the B shop Athletic Team that won the Team championship in the I. C. F. Athletic Meet 1958-59 held on the 13th and 14th March 1959, with Mr. R. Viswanathan, AWM II.

DID YOU KNOW?

By SCIO



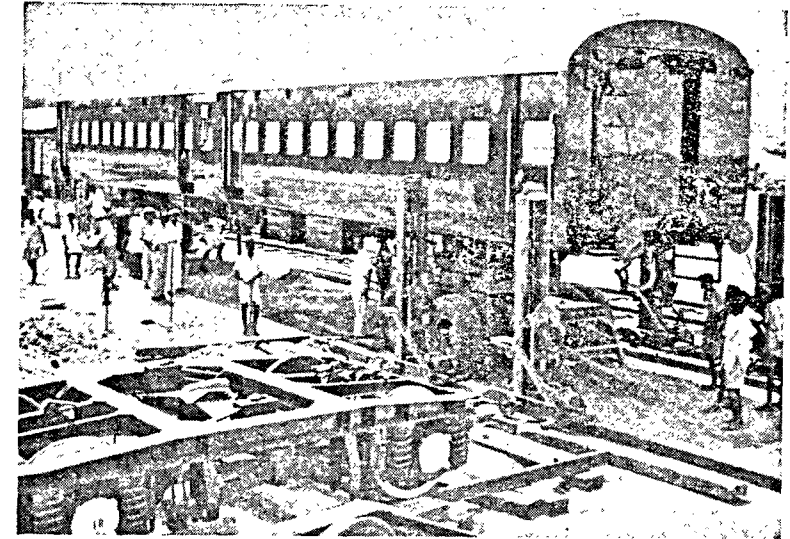
The largest telescope ever made is the Hale reflector on Palomar Mountain in California. Its main mirror is 200 inches wide and weighs 14½ tons. This huge instrument can make the moon look just eight miles away.



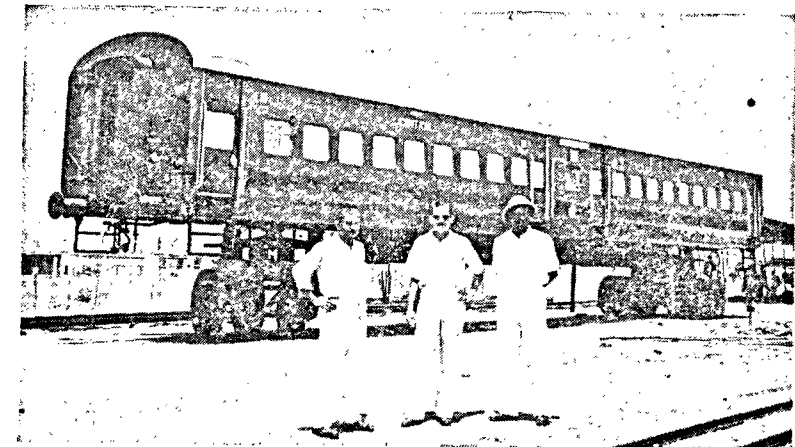
Dragonflies have been known to eat more than twice their own weight in horseflies in two hours. Contrary to popular belief, dragonflies are harmless to human beings.

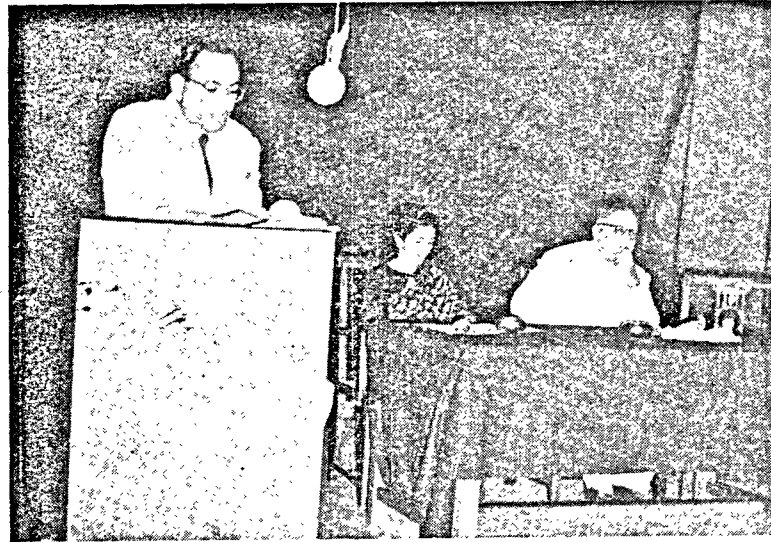


The largest consumers of cereal products in the world are the people of Southern Rhodesia. Colombians are the greatest sugar eaters. Icelanders consume the most milk and Uruguayans the most meat.



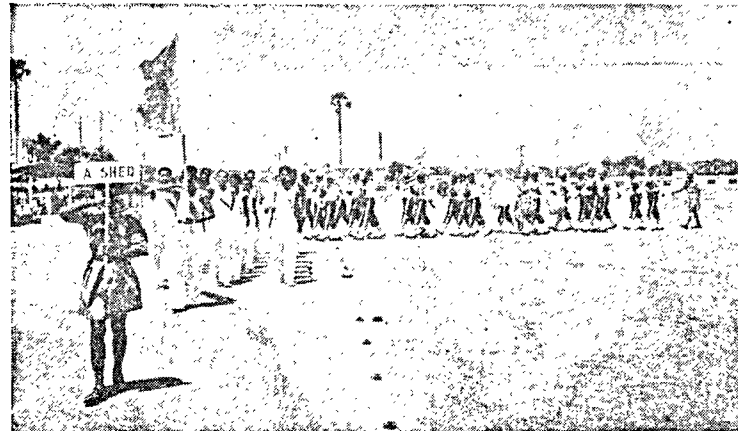
How the Integral Coach got into the Red Cross Exhibition was a mystery to quite a few who visited the Exhibition. These two photographs give the clue as to how the coach was transported. Mr. G. Debrass, Assistant Mechanical Engineer/Plant, and Mr. Srinivasan, Foreman, Millwright Shop, who were in charge of the operations can be seen in the pictures.





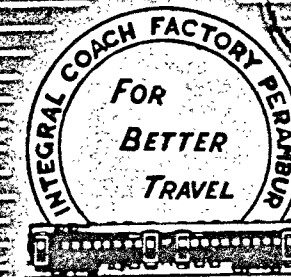
The Hostel Day Celebrations of the Apprentices Hostel attached to the Technical Training School were held on 1-4-59. Picture shows Shri Mahendra Lal, Principal of the Technical School, reading the Annual Report. Our beloved CME and Shrimati Aiana, wife of our Dy. CME/F, are also seen in the picture.

A colourful march-past of the Athletic Team of 'A' shop which won a cup for best turn-out in the I.C.F. Athletic Meet 1958-59 held on the 13th & 14th March 1959.

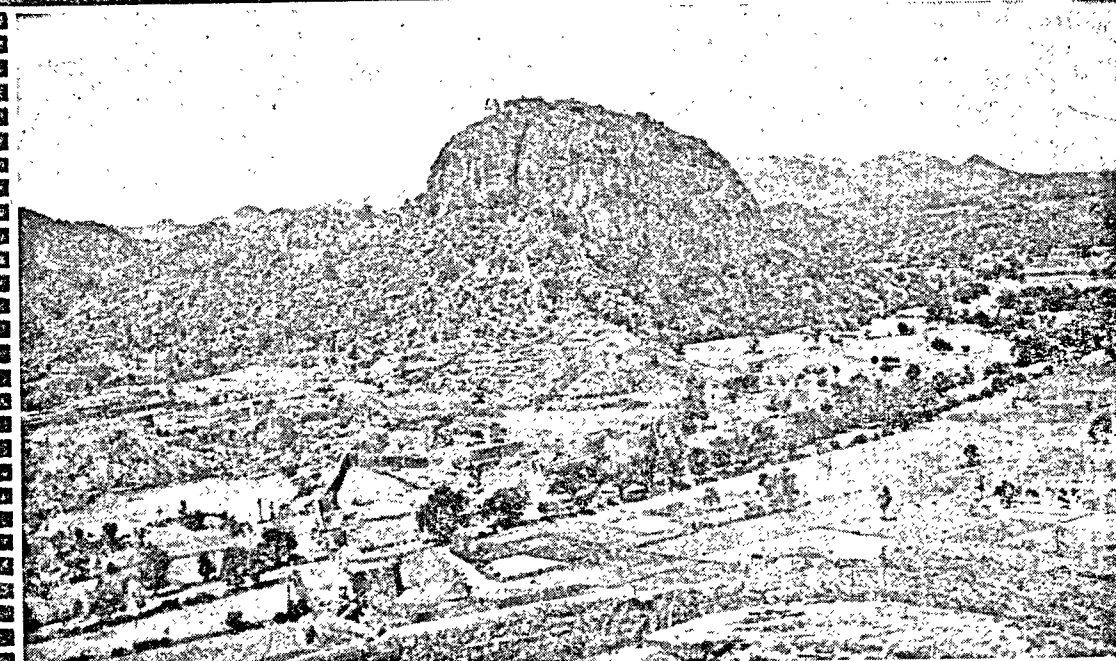


RAILCOACH

VOL. III, No. 9



JUNE 1959



A striking view of the Gingee Hill to which Fitter Apprentices of I.C.F. recently went on excursion.

(Photo : K. SANTHALINGAM,
Workshop Instructor.)

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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

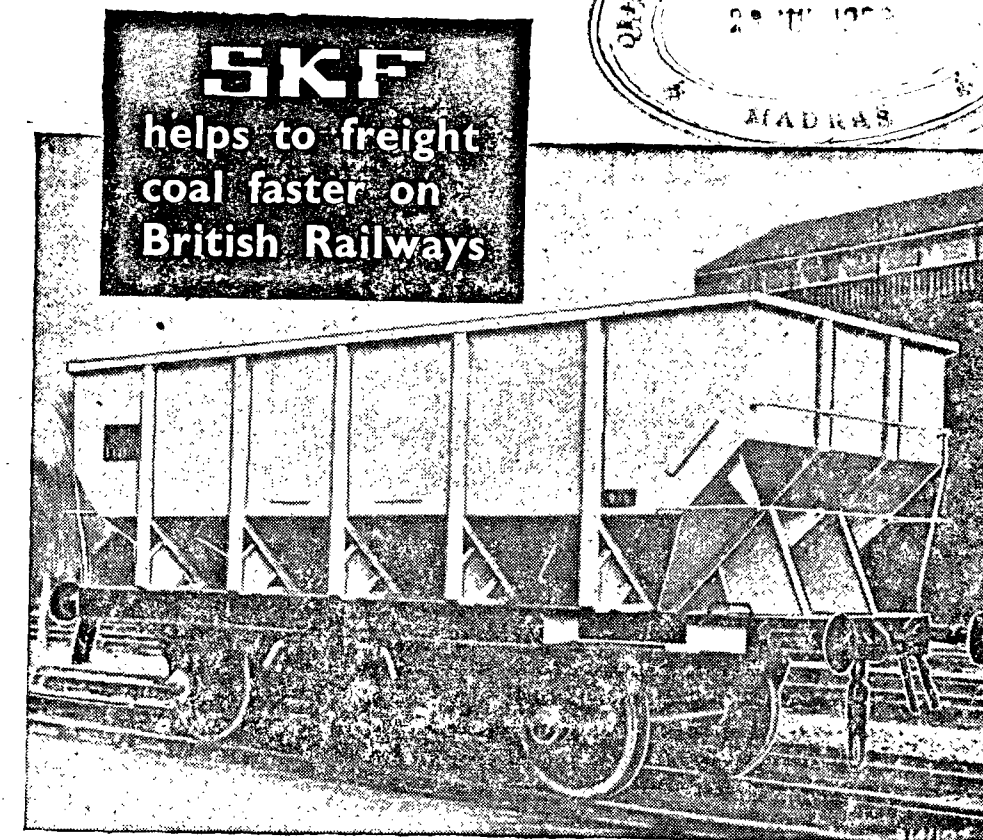
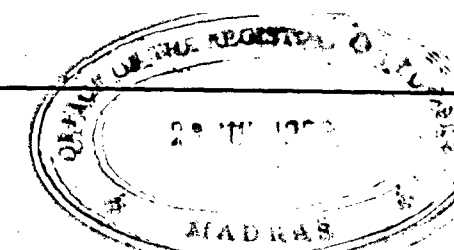
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2. Advertisement materials to reach the Editor before the 1st of every month for the month's issue.
3. Cheques should be drawn in favour of the Editor, "Railcoach", Integral Coach Factory, Perambur, Madras 23.
4. Texts of advertisements are subject 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



Photograph by courtesy of
Birmingham Railway Carriage & Wagon Company.

New 21 Ton hopper coal-wagons are fitted with SKF spherical roller bearing axleboxes

Maintaining fast transportation of coal is of vital importance to both the mining industry and the industrial users. Here is a photograph of one of the new 21 ton hopper coal wagons built by Birmingham Railway Carriage & Wagon Company for British Railways. This modern coal wagon is fitted with SKF spherical roller bearing axleboxes, designed to carry a load of 17½ tons per axle. During the last two years, SKF have received orders from British Railways for 20,000 axleboxes of this type to be fitted on wagons as illustrated, as well as on mineral and coal wagons.

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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.

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CONTENTS

JUNE 1959

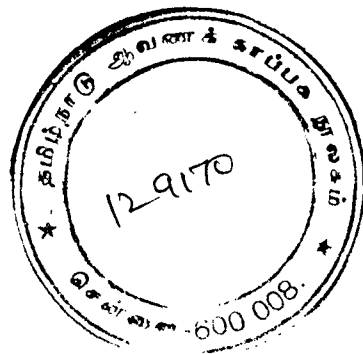
	PAGE
Editorial	4
What is News & Why	5
Monthly outturn	7
Visit of World Bank Railway Team to India	8
The Nation's Life-line	11
Aid to Better Management	17
Railway Snippets	20
News from Switzerland	21
March of Science	22
Launching of a Missile into space	23
Did you know	25
Integral coach goes to Red Cross Exhibition	26
A Picnic to Poondi	27
Prevention of Wastage	29
Safety, the first consideration at your Workspot	31
Awards for Suggestions	32
Awards for Bravery	33
General Cariappa Shield Football Tournament	35
An Excursion to Gingee	37
Visitors to the Factory	37
Wedding Bells	38
Brain Teasers	39
Wit and Whistle	40

NEW LINE OF PRODUCTION

The significant event during May was the commencement of regular production of T.L.R. shells. Readers will recall the launching of the first third-class-cum-luggage van fully designed and manufactured in the factory, on the 3rd January this year by Shri S. V. Ramaswamy, Deputy Minister for Railways. The necessary preliminaries for starting regular production of the T.L.Rs. having been completed, a start was made last month. The factory has now been turning out both Ts. and T.L.Rs. and the past performance emboldens us to say that, even in the manufacture of T.L.Rs., the targets set will be well exceeded. The activities hereafter will be more diversified and gaining tempo with the introduction of the second shift. We have not only to achieve stiff targets but also have to maintain the same standard of workmanship which we have hitherto shown. We have no doubt that the staff will fully justify the trust placed in them and more than fulfil the task allotted.

* * * * *

Elsewhere in this issue we have published photographs and also given an account of the cash awards given by the Chief Mechanical Engineer to Sarvaswari S. George and C. H. Narayana for courageous action and the presence of mind with which they prevented what would have been otherwise a serious accident. Their timely action is highly commendable and we take this opportunity to offer them our congratulations.



JUNE, 1959

WHAT IS NEWS AND WHY

Purchases of Railway stores from small units

The Railway Board has agreed to purchase certain railway stores exclusively from small-scale industries.

This follows the successful conclusion of negotiations conducted by the National Small Industries Corporation under the Ministry of Commerce and Industry with the Railway Board.

The items of railway purchases have been divided into four groups, viz., items which can be purchased only from large-scale units; items which can be purchased from large-scale units but where it is possible for the large units to subcontract ancillaries and components to small-scale units; items which can be procured from both the large-scale and small-scale sectors and items which are entirely reserved for procurement from small-scale units.

The small scale industries, for participation in railway stores purchase programme, will be given a suitable and reasonable price preferential up to a maximum of 15 per cent over the large-scale units if the purchase officer is satisfied that overhead of the small-scale industries is higher than that of the large units.

The items exclusively reserved for procurement from small-scale units, include brass padlocks, G. I. padlocks, brass dampers, boxes made of metal, sign boards painted, buttons metal, postal scales, all badges, cloth embroidered and metals, belt leather (apparel), cash bags, dust shield leather, chappals and sandals, leather bags, coir fibre, coir yarn, cotton hosiery and woollen hosiery.

Railway Concessions for Transport of Goods for Refugees

The Indian Railways will carry free of charge any consignment of relief goods for the Tibetan refugees from any railway station in India to Tezpur.

RAILCOACH

The Railways have made this special concession in response to a request made by the Central Relief Committee for the Tibetan Refugees to allow free transport of relief goods to Tezpur.

The facility of free transport will be provided for carrying relief goods to Tezpur by passenger, parcel or goods trains.

Relief goods will be carried by the railways on the production of a certificate in the prescribed form signed by the Secretary of the Central Relief Committee in New Delhi for the Tibetan Refugees. Any relief goods received from abroad would also be carried free of charge from any Indian port to Tezpur.

Corruption on Railways

The Railway Minister, Mr. Jagjivan Ram, urged the railway administrations to adopt a positive approach for tackling corruption while inaugurating at New Delhi a conference of Senior Deputy General Managers of zonal railways with the Railway Board on May 12, 1959. Emphasis, he said, should be more on the preventive aspect than on the punitive. The prevalence of corruption was an unfortunate legacy of the past inherited from the days when railways in India were company managed.

Investigations into cases of corruption, he said, should be conducted with the maximum speed, and where guilt was proved, punishment should be swift. At the same time it was the duty of the vigilance organisations to offer protection to the honest employee.

Deputy Minister Opens Katpadi-Latteri Double track

Mr. S. V. Ramaswami, Deputy Minister, Railways, declared open the second railway line between Katpadi and Latteri at Vellore on 13-5-59. In doing so he said that in doubling

the south-west line, preference was given to the lines adjoining junctions for the sake of operational convenience. If there was more money, he added, doubling could be done between terminus and terminus.

The Dy. Minister said that engines running on certain lines in the north-west were too heavy for lines in the south. If suitable engines were provided, 14 compartments could be attached to run on the lines south of Jalarpet.

The Dy. Minister observed that the loss due to ticketless travel and the pilfering of goods amounted to Rs. 28 crores and said these evils should be ended.

Mr. A. C. Mukherji, General Manager, Southern Railway, welcoming the guests said the scheme of doubling the line between Arkonam and Tiruppattur was estimated to cost Rs. 4 crores and would be completed within the plan period. A total of 23 miles had so far been done in three laps, namely the Arkonam-Chitteri, Katpadi-Tiruvalam, and Katpadi-Latteri. The cost of doubling the Katpadi-Latteri line was Rs. 28 lakhs and formed part of the sanctioned estimate for doubling the 15 miles between Mukundarayapuram and Latteri. The Katpadi-Latteri line was run on wooden sleepers of indigenous origin and would be worked with a speed of 30 miles per hour. He concluded by saying that the work was done in 39 days due to the untiring efforts of the staff and the workers.

Mr. D. B. Patel, Chief Engineer, proposed a vote of thanks.

Coal supply to Railway by sea

The Railway Board is considering a proposal to carry increasing quantities of coal for the use of the railways by sea with a view to encouraging coastal shipping.

At present, the railways carry their own coal to the south by ship while they carry public coal to the south by rail. As a result, they are expected in the current financial year to incur

a loss of about Rs. 3 crores arising from the higher cost of transportation by sea.

On every ton of coal which the railways send by sea for use by the Southern Railway, they incur an additional cost of Rs. 30. During this year they are expected to send over a million tons by sea.

Railway Book-stalls

The Railway Board has set up ad hoc committees for selecting standard books in English and other regional languages which should be stocked in railway bookstalls in addition to the books usually stocked and sold at the stalls.

Eminent educationists and authors would be members of these committees.

Amendment to Railways Act

The Bill passed by Parliament during its last session to amend the Railways Act enhancing penalties for certain offences, has received the assent of the President and has become law with effect from May 2, 1959. The Railway Board has issued instructions to Railway Administrations throughout the country asking them to take suitable consequential action immediately.

Obstruction of railway servants in the discharge of their duties, alarm chain pulling and a number of other anti-social offences which hamper the smooth working of the railways have become punishable with imprisonment or fine or both under the amended law. Some of these offences have been made cognizable.

Under the amended Act, for persons obstructing railway servants in the discharge of their duties, the punishment has been increased to imprisonment up to six months or fine up to Rs. 500, or both.

The railway authorities have now power to arrest without warrant persons indulging in offences relating to alarm chain pulling and to

travel without a proper ticket or a pass with intention to defraud.

Penalty for unauthorised alarm chain pulling has been raised from a fine of Rs. 50 to imprisonment up to three months or a fine of Rs. 250 or both. The offence has been made cognizable.

In the case of habitual ticketless travellers, courts have been given the power to ask an

offender to execute a bond for good behaviour with or without sureties.

The unauthorised occupation of a berth or a seat reserved for another has been made punishable with powers to the railway administrations to remove the unauthorised passenger from the reserved compartment, seat or berth.

The amended Act prescribes a fine up to Rs. 250 for unauthorised hawking or sale of any article whatsoever on railway premises.

Monthly Outturn

	Target figures		Actual figures	
	K.D. coaches	Indigenous coaches	K.D. coaches	Indigenous coaches
May 1959	...	30	...	35
Cumulative total for the first two months of the year 1959-1960.	...	60	...	70

RAILCOACH

VISIT OF WORLD BANK RAILWAY TEAM TO INDIA

The two-member team of the International Bank for Reconstruction and Development consisting of Mr. R. A. D. Loven, Mechanical Engineer, and Mr. A. F. Geolot, Financial Analyst, which arrived in New Delhi on the 12th May, had a meeting with the Railway Board on 13-5-59 for a general discussion, preliminary to its study tour of railway centres in India. In the afternoon, the members of the team met officials of the Railway Board for more detailed discussions.

At the morning meeting, the discussion covered the trends of railway operation so far during the Second Plan period and prospects for the future, technical developments already introduced or planned, aimed at achieving a greater operational efficiency, the progress of the Railway Second Plan and the development of railway finance.

The two-member team undertook a 4,500-mile tour of railway centres, including Madras, during their fortnight's stay in this country.

The team had been sent out to obtain first-hand knowledge of the operation of the Indian Railways and to make an on-the-spot study of the progress made in the execution of the Railway Second Five-Year Plan. The team will make its report to the World Bank. Negotiations for a further loan will then follow.

India was the first country in Asia to receive a World Bank loan, and it was sanctioned for the Indian Railways in 1949 to enable them to import locomotives from Canada and the U. S. A. The amount was 32 million dollars. Subsequently, a World Bank Technical team came to India for an on-the-spot study. This was followed by negotiations resulting in the grant of a loan of 90 million dollars for Railway Development in July 1957. Following

further negotiations, the Bank sanctioned an additional loan of 85 million dollars in September 1958, to cover payments abroad up to March 1959. Both the loans granted by the World Bank during the Second Five-Year Plan period had been fully drawn and utilised.

The team visited among other places, the Ganga Bridge recently opened by the Prime Minister, the Chittaranjan Locomotive Works, and the Integral Coach Factory. The team also covered the doubling of the Kanpur-Allahabad line, the remodelling and modernisation of the Moghalsarai Yard; the operation of diesel locomotives between Moghalsarai and Gomoh, the railway operation in the colliery area around Dhanbad on the Eastern Railway, the railway facilities around Howrah, including suburban electrification and the new electrical repair workshops at Kharagpur, the works around Tatanagar, the new line construction between Ranchi and Muri, the doubling of the Rajkharswan-Barajamda line, the new construction around Rourkela and the new Koel Bridge, the Rourkela-Durg doubling, the Vijayawada-Gudur doubling, the new route relay installation at Kurla and the Godhra-Ratlam doubling.

Throughout the tour, the team was accompanied by three Railway Board Officers, Mr. O. S. Murthy, Director of Planning, Mr. R. S. Krishnan, Joint Director, Mechanical Engineering, and Mr. P. R. Pusalkar, Joint Director, Transportation.

The team arrived at Madras on 25-5-59. Soon after arrival, the members met the General Manager of the Southern Railway and other senior officers and had a discussion with them. The team visited the Integral Coach Factory on 26-5-59, accompanied by Shri



The members of the World Bank Railway team visited the Integral Coach Factory on 26-5-59. Here they are seen seated inside a fully furnished coach. L. to R.:—Shri K. Swarup, our Chief Mechanical Engineer, Mr. A. F. Geolot, Financial Analyst, and Mr. R. A. D. Loven, Mechanical Engineer, both of the Technical Operations Department of the World Bank, and Mr. O. S. Murthy, Director, Railway Planning, Railway Board—Photo by Shri V. Dilli Babu

O. S. Murthy, Director, Planning, Railway Board.

On arrival, the visitors were received by Mr. K. Swarup, Chief Mechanical Engineer of the Factory, who introduced them to the principal officers of the Factory. They were then taken round the shops and the Shell Factory. They also visited the Technical Training School. Later, they had discussions with the principal officers of the Factory on the progress it had made since inauguration of production in October 1955.

The World Bank team also paid a visit to the Madras Harbour and spent about two hours in going round the various sections of the port. The team inspected the passenger station, the ore berth, coal berth and the wet dock which were under construction. The two-member team met the Railway Board in Delhi on May

19 after their fortnight's tour of the country. They also had a meeting earlier with the General Manager and senior officers of the Northern Railway. One of the members of the team had a meeting on 28-5-59 with Mr. G. Pande, Chairman of Hindustan Steel Limited. The members of the team left India on 30-5-59.

The Indian Railways have expended 60 per cent of the Second Plan allotment of Rs. 1,125 crores so far and are confident of achieving the planned target of 168 million tons of traffic annually by 1960-61. Detailed allocations had already been made for an expenditure of Rs. 235 crores during the current financial year, leaving only Rs. 211 crores for the last year of the Plan.

The Railway authorities are fully confident that they would be able to expend the entire

allotment of Rs. 1,125 crores during the Second Plan period. Of this total plan allocation, the foreign exchange component comprises Rs. 380 crores. This amount will be met partly by foreign loans.

A two-man delegation of the Railway Board has left for Washington to negotiate another loan from the World Bank for the development of the Indian railways. During the Second Plan period the Railways hope to spend nearly Rs. 430 crores on the procurement of locomotives, passenger coaches and goods wagons as against the allocation of Rs. 380 crores for this purpose at the beginning of the

Second Plan. Practically all passenger coaches, goods wagons and the bulk of the locomotives would be of indigenous make. Up to December 1958, the Railways had procured 1,400 locomotives, 3,000 passenger coaches and 72,000 goods wagons. Regarding doubling of lines and electrification of railways, by 1960-61, it is proposed to complete 1,300 miles of doubling, mainly in the eastern region and 800 miles of electrification of the Eastern and South-Eastern Railways. As against only five million tons of additional traffic which the railways carried in 1958-59, they are preparing to carry 14 million tons during the current year.



THE NATION'S LIFE-LINE

BY

P. C. MUKERJEE

CHAIRMAN, RAILWAY BOARD

Since the turn of the present century, more particularly since the end of the last war and the achievement of Independence, the work of the Railway Ministry has grown out of recognition. The size of operations has multiplied in all directions. In this article, the top executive of the Indian railways has highlighted a few aspects of the railway system where the developments have been most significant.

By 1903, the Indian railways had spread over the country covering 27,000 route miles in undivided India. This gave an average of 540 miles of new line construction per year in the first 50 years since the railways in this country were established, construction being done by a number of private companies as well as some Indian States, the former being guaranteed interest on capital on behalf of the Central Government.

Naturally, the private companies connected mostly centres of activity where there was possibility of traffic. In undertaking the construction of these lines practically all the equipment had to be obtained through imports, rails, fastenings, girders, carriages, wagons, locomotives, etc.

Since the turn of the present century, but more particularly since the end of the last war and the achievement of Independence, the work of the Ministry of Railways has grown virtually out of recognition. Upto 1925, the Government of India managed only three railways—the Eastern Bengal, the North-Western and the O. & R. Railways, with a total route mileage of 9,000. By 1950 all the railways including those of the Princely States had been brought under Government management and, even

though 7,000 miles of the old undivided Indian railway system had gone to Pakistan, the Indian Government had to be responsible for the management of 34,000 miles of railways.

Public interest in railways

It is gratifying that the interest displayed by the public in the working of the railways has continually been growing; evidence of this is found in Parliament. While in 1948 the number of questions answered on railway subjects was only 271, the figure rose in 1958 to 1928—more than sevenfold. This number is approximately one-ninth of all the questions answered in Parliament in 1957-58 on behalf of all the 23 Ministries and Departments at the Centre.

Similarly, correspondence as gauged by receipts in the Railway Board's office stood at 543 receipts per day in 1952, and increased more than five times to 1,710 per day in 1958.

How railways have grown

Enough has been said about the railways' two Five-Year Plans to call for detailed comments here. The need for increasing rail capacity has been urgent, and much has been done during the first Plan and the second Plan so far. The developments that have occurred can best be summed up in the following figures :

CLASS I—GOVERNMENT RAILWAYS

	1938-39	1948-49	1951-52	1956-57	1957-58
Works Machinery and Rolling Stock Programme (crores of rupees) ...	9.41	54.01	59.08	178.95	250.66
Total Staff ...	6,41,099	8,56,795	9,23,069	10,56,692	11,11,026
Total gross receipts (crores of rupees) ...	103.5	225.7	291.8	348.9	381.4
Total working expenses (crores of rupees) ...	68.8	178.0	225.8	278.8	309.3
Tons originating (million) ...	84.4	78.5	96.7	124.1	132.1
Ton miles (million) ...	21,878	22,387	28,966	40,186	44,861
Passengers originating (million) ...	499	1,114	1,204	1,360	1,410
Passenger miles (million) ...	17,988	37,129	39,030	41,878	43,043
Total stores purchases (crores of rupees) ...	9.38	100.4	97.7	171.4	221.8
<i>Rolling Stock as on 31st March :</i>					
Number of locomotives ...	7,919	7,761	8,411	9,601	10,025
Number of passenger-carriages (units). ...	16,620	12,665	14,486	17,402	17,599
Number of wagons including special wagons (units) ...	205,017	198,863	206,496	256,076	275,970

Research design and technical development

Side by side with all this increase in the activities of the railways, there has been a significant change in another direction. A reversal of trend has taken place from a system under which most of the designing and supply of equipment came from abroad, and technical work in India was confined merely to the construction of lines and the maintenance and operation of the railways. The position has now radically altered. In consequence, the railways have had to concentrate on research, testing and standardization work to a far greater extent than before. They have had to undertake considerable new technical work too.

It has not been possible to expand the research and designs organisation to the extent necessary because work of this nature calls for considerable experience. Care has also to be taken to confine research activities to matters of immediate necessity in order to make the best use of the limited trained manpower and money. Since it would be a waste of resources to undertake here work which is already being done in other countries, considerable attention is being paid to a study of the research and design work being done abroad in order to derive the maximum advantage from it.

Self-sufficiency drive bears fruit

The railways have also played a leading role in developing capacity for the manufac-

ture of their requirements within the country. Items where increases have been most significant are :

Items	(lakhs of rupees)	
	1947-48	1957-58
Engineering plant and components ...	5.63	35.84
Workshop machinery and tools ...	7.70	89.65
Permanent way material	379.4	2400.9
Steam locomotives and parts ...	60.88	13,59.23
Wagon underframes and parts ...	275.73	1,450.64
Signalling equipment ...	15.6	201.9
Electrical, train lighting, telegraph and telephone equipment ...	33.37	735.46

Notable work has been and is being accomplished in the field of long-term planning. Heavier wagons, more powerful locomotives, electrification, dieselisation, improved track standards—all these and many other types of work have been undertaken.

Third Plan

The third Plan is yet to be formulated, but with even the very little that can be foreseen at this stage, it appears that an annual freight capacity of 260 million tons may be required to be built up by the end of 1965. The railway third Plan can be formulated in more precise terms only after a clearer picture is obtained of the major industrial and agricultural developments to be undertaken in the third Plan period.

There are vast tracts in the country which have still to be opened up. Most of the easier terrain having already been covered, new construction will largely be in the more difficult areas. It will, therefore, necessarily

be costlier, even apart from the increases that have occurred in the costs of materials.

Have railways outlived usefulness?

Sometimes there is a feeling that the railways have outlived their usefulness. In the ultimate analysis, even in countries where rail capacity exceeds their needs, the railways are and will remain their life-lines. No large area can maintain its economic life without railways.

In India, such a feeling should not exist.

The pressing transport needs of a developing economy, combined with the need for spreading the benefits of this economy throughout the country, cannot be met without the railways.

The Indian railways help in many ways, may be not strictly commercial in nature, but in the larger interests of the country. For instance, the railways carry at low rates coal to the south for public consumption. Paradoxically, they have to carry some of the coal for their own use (by the Southern Railway) by the costlier sea route. Rail transport is cheaper and the benefit of this is given to the public, while the railways themselves have to pay about Rs. 3 crores in additional freight on carrying their own coal by the sea route. Again, it is well known that the railway freight structure provides for special low rates for the transportation of industrial raw materials in the larger interests of the national economy. These are but two instances of policies adopted by the railways in national interest, which cannot be expected from any other transportation organisation.

Indian Railways cheapest

The Indian railways provide about the cheapest form of transport as will be apparent from the table below :

Average fare per passenger per mile and average rate charged per ton per mile on Indian and selected foreign railways 1956-57 are given below :

Railway	Average rate (pies)	
	Per passenger mile	Per ton mile
Indian ...	5.33	11.3
British ...	15.5	33.9
Canadian National ...	29.1	13.9
Canadian Pacific ...	27.5	13.2
French National ...	21.4	27.0
German Federal ...	13.4	26.1
Italian State ...	11.1	18.0
Japanese National ...	5.4	11.2
Swedish State ...	18.8	24.7
Swiss Federal ...	17.2	48.1
U.S. Class I ...	24.5	12.7

Source : Annual Reports of Indian, British, Canadian National and Canadian Pacific, Japanese and U.S. Railways. Figures for other railways extracted from International Railway Statistics, 1956.

INDIAN RAILWAYS ARE THE CHEAPEST

COUNTRY	GOODS	PASSENGERS
INDIA	11.3	5.33
BRITAIN	33.9	15.5
CANADIAN NATIONAL	13.9	29.1
CANADIAN PACIFIC	13.2	27.5
FRENCH NATIONAL	27.0	21.4
GERMAN FEDERAL	26.1	13.4
ITALIAN STATES	18.0	11.1
JAPANESE NATIONAL	5.2	5.4
SWEDISH STATES	24.7	18.8
SWISS FEDERAL	48.1	17.2
U.S. CLASS I.	12.7	24.5

While comparing Indian figures with those of Japan or other industrially advanced countries, allowance should be made for the fact that there are many items of railway equipment which are still not made in this country. Steel supplies, too, have had to be imported to an appreciable extent. Imported items naturally raise the cost of transportation.

Need for economical transport

The need for providing transport in the most economical way can hardly be over-emphasised, as this has an important bearing on the economic development of the country. In many areas the railways will have to face big tasks in increasing capacity on some of the existing lines or in opening up new lines. For all this, railwaymen must be suitably equipped so as to enable them to make the best use of modern technological advances.

In the past railway assets have been allowed a very much longer life than will be possible now or in the future. The changing pattern of traffic in a developing economy calls for yard alterations and remodellings and other line capacity works, and often buildings have had to be removed to make room for new works. With heavier trains, electric or diesel locomotives, greater speeds, rail renewal programmes will also have to be accelerated.

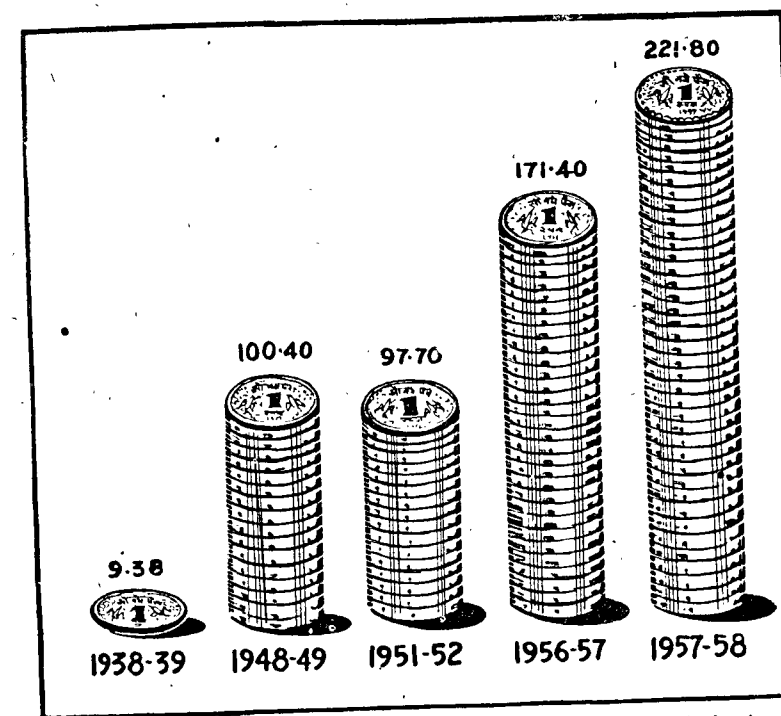
Density of traffic

The following figures showing density of traffic will be read with interest.

The chart shows the comparative fare and freight rates on the Indian and selected Foreign Railways. The average rate per passenger on the Indian railways is 5.33 pies per mile, while the average rate for goods is 11.3 pies per ton mile—in both cases the lowest amongst the world's leading railway systems.

Class I—Government Railways

	Density of Traffic				
	1938-39	1948-49	1951-52	1956-57	1957-58
Train miles per running track mile per day :					
B.G.	13.8	14.9	17.1	19.5	20.0
M.G.	11.5	10.1	10.8	12.0	12.7
All gauges	12.3	13.0	14.0	15.5	16.1
Passenger miles per running track mile per annum :					
B.G.	502,008	1,339,185	1,357,792	1,426,724	1,489,384
M.G.	403,145	863,581	821,360	841,785	816,698
All gauges	445,917	1,105,767	1,057,804	1,103,717	1,127,309
Net ton miles per running track mile per annum :					
B.G.	749,287	1,023,160	1,304,043	1,726,828	1,902,756
M.G.	240,572	217,276	254,625	388,394	447,674
All gauges	542,359	666,736	785,422	1,059,109	1,174,935



Indian Railways Shopping Bill : The chart indicates the marked rise in the railways' stores purchases from Rs. 100.40 crores in 1948.49 to Rs. 221.80 crores in 1957-58, an average of nearly Rs. 61 lakhs in each 24-hour period.

Need for trained personnel

Rolling stock when it is used more intensively and at greater speeds will need greater attention. All this will result in replacement programmes having to be accelerated and a heavier load of work in maintenance and repairs. Due to all this the need for highly trained personnel will be increasingly felt.

The very heavy programme of work has imposed a severe strain on the resources of technical personnel for the execution of works. In earlier days, the average service of assistant officers before they were promoted to district

ranks was 8 to 10 years in the Traffic Department, 10 to 12 years in the Mechanical Engineering Department and 12 to 14 years in the Civil Engineering Department. The position now is that in many cases technical officers have to hold district and executive charges after barely 3 to 4 years of service as assistant officers in a working post.

Although in spite of this handicap the record of the railways in regard to the Plan targets is an enviable one, it would be desirable to plan ahead now so that future Plan requirements of technical personnel can be met with officers adequate in number and experience.

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AID TO BETTER MANAGEMENT

BY

S. K. GUHA

DIRECTOR OF STATISTICS AND ECONOMIC ADVISER, RAILWAY BOARD

Statistics have played a key role through the long years of Indian railway history in enabling Government to take several crucial decisions. At present, the railways' large statistical organisation discharges a dual role as an aid for the measurement of efficiency and as an agency for effective Governmental check and control over a far-flung system. The author here traces the evolution of railway statistics since 1870 and refers to the increasing reliance Government has placed on them.

Statistics has been variously defined as "State Arithmetic," "a science of deriving facts from figures," "a body of methods for making wise decisions in the face of uncertainty," and so on.

Whatever be the definition, there can hardly be two opinions that statistics are one of the most important tools of administration, particularly for a vast and complicated organisation like the railways with a countrywide range of operation, large personnel, great resources, varied equipment and the entire community to serve. They help in obtaining an indication of the extent to which the transport requirements of the country are being met, the degree of efficiency with which the system is being run and the financial results of its operation.

Statistics as an aid to measurement of efficiency show where, when and what action is needed. Efficiency measurements again depend essentially on the collection and use of statistics and in this respect all major transport undertakings have had extensive statistical services for many years.

Hand-maid of Government control

From the very beginning of the Indian railways, statistics had to be maintained as a part of Government control. In view of the Government guarantee of interest to the private-owned companies, besides in some cases participation

in capital, Government exercised certain statutory control over finance, standard of maintenance of operation, safety measures etc. Public interest in railway statistics centred mainly in their financial aspects and for many years after the first railways were opened such statistics as were produced were primarily directed towards showing the return on capital investment, although commodity statistics were also prepared to some extent for trade purposes.

It was only when comparisons between different railway systems came to be a matter of interest that statistics of actual working were found to be necessary and even then the tabulation and examination of these figures were directed primarily towards ascertaining the ultimate cost of transportation as a marketable commodity.

In the recognition of the use of railway statistics for checking and improving the actual working of traffic, the Indian railways led the way amongst the railway systems of the world, for it was as early as 1870 that the East Indian Railway Company first introduced figures showing passenger and ton mileage returns as a result of certain recommendations made by the late Sir Alexander Rendel in 1867. These returns were adopted on other railways and appeared in the report for 1872 by the Government Director of Indian Railway Companies.

Evolution of present-day statistics

These statistics were gradually elaborated until 1880 when the form of statistics at that time being compiled by the railways was revised following the deliberations of a special committee under the presidentship of Col. J. G. Medley, R. E., Consulting Engineer for Guaranteed Railways to the Government of India. Considerable changes were introduced thereafter.

And yet the Acworth Committee which sat in 1921 found these statistics out of date and not in conformity with the current requirements. Many of the complaints against the old form of statistics were due to the form of presentation. In many cases, it was difficult to find the figures required. Many of these figures were again not of sufficiently practical nature to be of much assistance to operating officers. To remedy this state of affairs, a committee of two railway officers, Major F.H. Budden and Mr. W. H. Scott, was appointed in October 1922 to report on the changes necessary in the statistics kept by the Indian railways. The existing pattern of railway statistics is generally the outcome of the report of this committee. The mode of presentation along with the contents and character of the statistics has, however, again been largely reorientated in recent years.

The important statistics now obtained from the Railways may be divided under the following principal heads :

Economic and financial, transportation, rolling stock, workshop repair and administration.

Railway statistics have been gradually elaborated over the last century to their present comprehensive form and they are now brought out in the shape of various periodical summaries and monthly booklets for official use. An exhaustive volume containing all the relevant important statistical data is also published

annually by the Railway Board. Individual railways, in addition, compile and maintain such other statistics as they find necessary for the purpose of exercising domestic control.

Vital decisions based on statistics

The early railways in this country were constructed and financed by companies under Government guarantee of interest at rates varying between $4\frac{1}{2}$ and 5 per cent, followed by a period of State construction with borrowed money, after which the earlier procedure with modified guarantee terms was reverted to. Even the limited statistics of working expenses that the companies were obliged to keep in the initial stages clearly brought to light the evils of the guarantee system. An analysis of the financial statistics revealed the defect in the method of sharing the profits under this system, which required the surplus profits to be divided half-yearly and which thus deprived the Government of the benefits of the first half of each year when the traffic was usually much more brisk than in the latter half of the year.

With the abandonment of the guarantee system, termination of the contracts of the older companies and their purchase by Government, the route mileage of railways in India opened in 1920-21 stood at 37,029, of which 26,889 miles were owned by Government, but only 8,929 miles were worked by them. These statistics giving the particulars of mileage opened to traffic along with the statistics showing the financial results of working highlighted the need for greater direct participation of the State in the management of railways.

Statistics have also been found handy and helpful in arriving at major policy decisions like the separation of railway finance from the general finance.

Similarly, the maintenance of staff statistics has clearly brought out the need for Indianisation of the services and later on in recording its progress.

The publication of stores purchase statistics enables Indian industry to assess the directions in which capacity could be developed in the country for various items of stores requirements of the railways.

Role in operating efficiency

The maintenance of railway revenue statistics again makes the necessary adjustment of rates possible, as also the control over expenditure on the basis of past performance. Detailed statistics of passengers carried, labour employed, production in workshops, etc., are also maintained and are of great help in improving efficiency on the railways. While statistics relating to efficiency of operation, control of expenditure, etc., are primarily of interest only to railways, those relating to the volume and movement of commodities are of great importance from the point of view of the economic life of the country. These statistics are also published in the Annual Report of the Railway Board. Statistics of the movement of specific commodities between different trade blocks in the country are compiled by railways and published by the Director-General of Commercial Intelligence and Statistics.

In certain directions, the present statistics require amplification, as for example, to show the flow of commodity movements for different distances, and steps are under consideration for improving them accordingly.

We are in the midst of a Plan era in our country, when forward planning is necessary so that transport bottlenecks do not retard the pace of development in the other sectors. More and more emphasis is now being laid on greater operational efficiency and economy in working. It is here that statistics play an important role in the operation of the railways. They enable the executives of the organization to judge the present performance in relation to past achievements, thus aiding them to make an assessment of future needs and fix future targets capable of easy attainment.

They also enable the country's legislators to exercise effective control over the efficient administration of such a vast and complex organization, pinpointing weak spots with a view to plugging loop-holes, as will be evidenced from the increasing interest taken by members of Parliament.

Statistical quality control

Statistical techniques have of late been improving in their application to industry. One such development is in the field of statistical quality control. This is being widely applied in improving the working of industrial undertakings.

The procedure can be defined in non-technical terms as a critical examination of the technical aspects of production in order to highlight weak spots. This will enable the management to find out how to reduce costs, avoid high percentages of scraps and seconds, and increase productivity as also the quality of the product.

This technique would be of particular advantage in manufacturing operations and could, with advantage, be adopted in such enterprises as the workshops, the Chittaranjan Locomotive Works and the Integral Coach Factory.

Sample survey

Another technique gaining ground is the sample survey. The application of this method, however, is not unknown to the railways. In fact, sample surveys were conducted for the Railway Freight Structure Enquiry Committee to ascertain the loads of traffic and earnings relating to 72 individual commodities, to determine their distribution between selected distance scales.

Sample surveys have also been conducted to assess the extent of overcrowding on different sections. These techniques could be improved upon further and extensive use made of them to cover other problems from time to time, such as the effect of the quality of coal and of the training imparted to firemen, etc., on the

fuel consumption ratio, the influence on engine utilisation arising out of the system of assignment of particular crew to particular engines, etc.

The Indian railways are a big force in the

country's economic development. In the years to come, they will be called upon to play an even more important role. Statistical analysis, interpretations and aids will continue to enable the railways to shoulder this responsibility.

RAILWAY SNIPPETS

Industry follows the railways

Bombay got its first textile mill in 1854, a year after it had its first railway train. The railways in the Calcutta area came in 1854 and later in that same year followed the first jute mill. It was only after the former East Indian Railway began the construction of a line in the centre of the Jharia coalfields that coal companies were formed, and railway sidings were asked for faster than they could be laid.

Rail transport for foreign trade

India's total imports were valued at Rs. 58 crores in 1878. Thanks partly to the railways, these increased to 105 crores by 1901 and to

800 crores by 1956-57. During the same period, exports rose from Rs. 67 crores to 121 crores and in 1956-57 to Rs. 600 crores.

The mounting millions

A true measure of the growth of the Indian railway system is provided by the increase in its capital-at-charge. This went up from only Rs. 3.7 million in 1853, the year in which the railways were established, to Rs. 900 million in 1871, Rs. 2,130 million in 1890, Rs. 4,390 million in 1910 and to Rs. 13,509 million in 1958-59. Gross earnings have gone up from Rs. 90,000 in 1853 to Rs. 3,944 million in 1958-59, and working expenses from Rs. 41,000 to Rs. 3,191 millions in 1958-59.

NEWS FROM SWITZERLAND

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

The Swiss federal railways in 1958

In 1958, the Swiss federal railways carried 222 million passengers, which brought in receipts amounting to 81.4 million U.S.A. dollars. Both these figures are slightly higher than the best results achieved previously (in 1957). In goods' traffic, on the other hand, the slowing down in business caused a decline in tonnage as well as in receipts.

Swiss railways rolling stock

With a view to the modernisation of their rolling stock, the Swiss federal railways put into service, last year, no fewer than 1,476 new vehicles, namely 201 standardised carriages for the transport of passengers, one Pullman car, seven dining-cars and 1,267 freight cars of various types for carrying goods.

A new locomotive for the Swiss federal railways

The Swiss federal railways are testing a new electric diesel locomotive, for shunting purposes. This 600 HP machine, with an 8-cylinder diesel engine is the first of its kind in Switzerland. Possessing a relatively high speed of 65 km

per hour, it can be used not only for shunting, but also, in case of need, for hauling trains along the ordinary lines. The locomotive in question is also equipped with a particularly interesting innovation, namely, an electric brake. Although usual on the electric locomotives of a lesser power, which run on the mountain lines, this type of brake is being used here, for the first time, on an electric diesel engine of this power.

Switzerland in electronic watchmaking

A big watchmaking firm from Geneva exhibited the smallest quartz clock in the world, at the Basle Industries Fair. This clock is enclosed in a case of 50.6 cubic inches, measuring 5.12" in length; it is propelled by means of a battery of accumulators which ensures a running time of 70 hours, without any recharging; its consumption of energy amounts to 15 milliwatt. This little clock, which has an oscillator of quartz crystals and an electric micro-motor of 0.78" in diameter and 1.38" in height, is a real high precision electronic clock.

MARCH OF SCIENCE

IGY studies disclose new facts about earth's atmosphere

Perhaps the most important progress in the field of geophysics during the International Geophysical Year concerned the studies that scientists made of the earth's atmosphere.

This is the carefully considered opinion of Dr. Lloyd V. Berkner, Chairman of the Space Science Board of the U.S. National Academy of Sciences.

"Now we have data to describe the planetary behaviour of the atmosphere in considerable detail, its circulation, and the influences of changing circulation on weather and climate," Dr. Berkner points out.

He explains that the earth as a whole is very difficult to see and to describe. Consequently, during the IGY, geophysicists planned observations at many places distributed over the whole surface of the earth, so that observations made simultaneously at these many widely separated points could be combined into a planetary description of atmosphere and other phenomena.

One of the most interesting discoveries made during the IGY is the fact that the earth's atmosphere extends outwards about 30,000 miles, instead of about 280 miles as was formerly believed.

Another finding was that the space through which the earth moves is not a void, as had previously been assumed, but is probably filled with thin gases. These gases, it is believed, are the outer portion of the sun's atmosphere.

Research rockets and scientific earth satellites were important tools of incalculable value in obtaining new information about the atmosphere. During the IGY, nearly 400 research rockets were launched by seven nations

—Australia, Canada, France, Great Britain, Japan, the United States and the USSR.

Nearly 200 were launched in the United States programme alone. These were sent aloft from Fort Churchill, Canada; White Sands, New Mexico; San Nicolas Islands, California; and from ships in the Pacific, Antarctic and Arctic Oceans.

Equipped with such instruments as Photon counters, Geiger counters, ionization chambers, mass spectrometers, solar spectrographs and magnetometers, these rockets gathered a tremendous amount of information about phenomena of the upper atmosphere.

Analyses of this new information are only now beginning; but a few of the major results are already known.

Measurements were taken at varying high altitudes of atmospheric pressure, temperature and density, and also of wind speeds. All of these measurements are of extreme importance to a better understanding of the weather.

For the first time a total eclipse of the sun was observed by rockets, and the first direct evidence was obtained that solar X-rays originate in the sun's corona—a luminous "envelope" that surrounds the sun. The corona can be studied only during a total eclipse.

Total cosmic ray intensity was measured at many altitudes and from many points on the earth's surface, representing different geographic and geomagnetic latitudes. Measurements were also made of the earth's magnetic field at high altitudes.

But perhaps of greatest interest was the discovery that solar X-rays appear to be the cause of increased ionization—or electrification—of the atmosphere. It is this increase of ionization that causes radio blackouts at times of intense solar activity.

In the IGY satellite and space-probe programmes, the most outstanding result to date appears to be the discovery of the Van Allen radiation zones in the high atmosphere. These are named for Dr. James A. Van Allen of the State University of Iowa. He and his colleagues have designed the radiation detection instruments for all the United States satellites and space-probe rockets launched to date.

Data provided by the United States Pioneer III space-probe rocket proved particularly valuable in giving needed information about these zones. It now appears that there are two of these radiation belts.

The first is located roughly between 1,400 and 3,400 miles above the earth, while the second is between 8,000 and 12,000 miles distant. The radiation is probably caused by electrified particles of hydrogen gas ejected from the sun, scientists believe. The particles stream out into space and are trapped by the earth's magnetic lines of force.

Other important new information was also obtained from the reports made by the United States satellites. Studies of atmospheric drag on the satellites have indicated that the density of the atmosphere at high altitudes is at least ten times greater than was previously believed. This, in turn, implies that the temperature in the uppermost part of the earth's atmosphere is much higher than formerly was thought possible.

In other IGY studies of the atmosphere, scientists discovered and mapped the position of the so-called electrojet. This is a planet-circling electrical current high in the atmosphere over the magnetic equator. It is believed that this equatorial electrojet, combined with similar currents that circle the North and South magnetic poles, is responsible for changes in the earth's magnetic field, which scientists previously could not explain with certainty.

—USIS

LAUNCHING OF A MISSILE INTO SPACE

The atmosphere is tense; the suspense almost unbearable. As the loud-speakers ask everybody to clear the area around the rocket launching pad, tight nerves and set teeth give everything a nightmarish appearance. And then the crucial moment comes. A deafening roar rends the air. Another 10 seconds—and the metal arms that hold the missile on the pad all back and the cry goes up "Liftoff!"

Rumbling and roaring, the ponderous missile leaves the pad and soars aloft into the mysterious unknown. Tense nerves relax. There is exultation, but there is also exhaustion.

The launching of a missile is always accompanied by such feverish activity on the part of

the crew of technicians working near the site. Making the final check on a huge intercontinental missile's readiness for flight in one of the most delicate and exhaustive operations in the present-day world of scientific and engineering technology.

Called the countdown, this final check takes from 7 to 12 hours, depending on the number of "holds"—the stops that are made to verify a check or to re-check one of the multitude of parts.

When, at some future date, such missiles become operational, the countdown and launching will take only a few minutes. Today, however, the careful minute-by-minute checks

are necessary because the missiles are being testfired and checking is necessary to obtain needed research information.

Dozens of major instruments, valves, electrical circuits, tanks, hydraulic systems, lines and hoses are checked one by one. After this has been done, a number of sub-systems must be painstakingly and accurately tested and pronounced O.K.

The countdown on intercontinental ballistic—or self-guided—missiles such as the United States' Atlas usually commences about 10 hours before the time set for the launching. To start the countdown the test conductor announces over a loudspeaker: "T minus 600 minutes and counting." From that moment on each member of the testing crew is strained, alert and utterly concentrated on the almost unbelievably complicated and exhausting job.

The Atlas missile, which is 85 feet long and weighs about 100 tons, has a range of more than 6,000 miles. It flies at a speed of about 15,000 miles an hour. Its propulsion system, which delivers a thrust of more than 350,000 pounds has been described as the most powerful missile system in the free world to reach the stage of production and testing.

When the test conductor starts a countdown, the technicians who form the testing crew have before them 80 typewritten pages on which are listed the 36,000 parts that must function properly before the test missile can be launched. One by one, the test conductor reads out the name of each part. As he does so, the part is activated by remote control by members of the testing crew. If the part functions perfectly, the fact is indicated by a light on a control panel.

At no time are the testers near the great missile that stands erect on the launching pad. They work in a small concrete blockhouse filled with an intricate array of testing equipment, which is situated some 750 feet from the

pad. They watch the missile through four periscopes that extend above the roof of the house, and on four television screens.

The testing proceeds in a strange, intent silence, broken only by the voice of the test conductor and responses made by members of the testing crew. From time to time the conductor announces the passage of time, saying slowly: "T minus 500 minutes and counting," and later, "T minus 420 minutes and counting."

In addition, the passage of time is marked by a second hand on a large, specially-constructed clock mounted under the four television screens.

At T minus 60 minutes, with only one hour more to go, the area around the launching pad is cleared. Technicians and engineers withdraw, and the fuelling of the giant missile is commenced.

The crucial moment of launching is now approaching rapidly and the tension increases. Motionless, and with eyes and minds concentrated on charts and instruments, the testing crew proceeds with its work, watchful and silent except for the few necessary spoken words.

Then, at T minus four minutes, a stream of water begins to flow over a huge flame deflector to protect it against the tremendous heat of the blasts from the rocket engines.

Two minutes flash by, and there are only two minutes more to go. At this moment, T minus two minutes, the electrical circuits in the missile are switched over from the launching pad system to the missile's own power sources.

At T minus 27 seconds the test conductor pushes a black button. This is the last human act necessary for launching a missile. From that moment on, an automatic device does all the needed work—unless something goes wrong. If that should happen, the test conductor would press a large red knob that would cut off everything.

In utter silence the count of the few remaining seconds goes on: "Eight, seven, six, five—four!"

At the count of four the air is filled with an ear-splitting roar. The rocket engines start, belching great streams of flame. For 10 seconds more the missile is held on the launching pad. Then in a split second the giant released from bonds makes for the skies and gate-crashes into space.

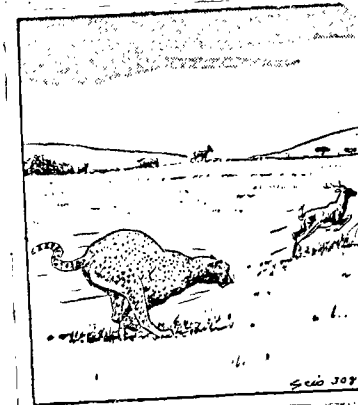
Climbing vertically and spurting out a thick

trail of yellow flame, it turns to a more level course and rushes into and through the clouds far beyond the naked eye can see.

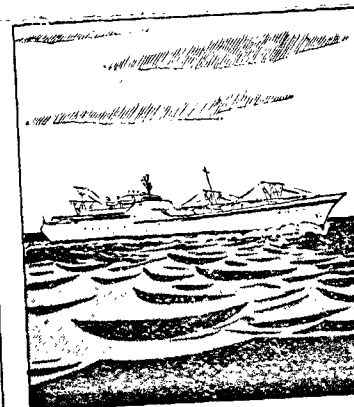
Exhausted but exultant, the testing crew rushes out of the blockhouse and watches until, in an incredibly short space of time—about 55 seconds—the missile is out of sight. For another 30 seconds or so they hear the dwindling roaring of the engines. Then there is once more an uncanny silence. The countdown has ended and the missile is on its way. —USIS

By SCIO

DID YOU KNOW



In India and the countries of Asia, men have been training cheetahs for centuries to make use of their blinding 75-mile per-hour speed in hunts. The cheetahs are caught wild and fully grown and are trained into complete docility in about six months.



The U.S. nuclear ship Savannah, now under construction, will be the world's first atomic-powered merchant vessel. Scheduled for launching in 1960, experts say the ship's speed may be 35 knots, and her cruising time before refuelling will be 3½ years.



Muscles are the most important source of body heat. Under average conditions body muscles produce enough heat to boil a quart of freezing cold water every hour.

—USIS

INTEGRAL COACH GOES TO RED CROSS EXHIBITION

BY

C. R. SWAMINATHAN

The Red Cross is a voluntary international organisation, founded in 1864 by a Swiss Citizen, Henry Dunant, with the object of rendering aid to the sick and wounded on the battle-field. This object has since been extended to include aid to all the sick and suffering, whether in war or in peace.

The Indian Red Cross Society is a voluntary humanitarian organisation, established by an Act of the Indian Legislature in 1920 and has branches in all the States, with an overall membership of over 67,000 Seniors and 13,07,000 Juniors. It is a national institution embodying the ideal of brotherly help and is truly free from religious, sectarian or political affiliations, its sole activities being directed towards the "*improvement of health, prevention of disease and mitigation of suffering.*" It is recognised by the International Committee of the Red Cross and is affiliated to the League of Red Cross Societies at Geneva.

The Madras Branch of the Indian Red Cross Society, during the Centenary Celebrations of the RED CROSS, opened an Exhibition-cum Trade-Fair, Carnival and Tattoo on the 26th March 1959, converting the deserted Island Grounds at Mount Road, Madras, into a pleasure-seeker's island. To this Exhibition the Integral Coach, built in the I.C.F. No. GTY 5055 (meant for the Central Railway) was transported with great effort. On the roadside *en route*, the 70 feet long giant coach was witnessed with great curiosity by thousands of passers-by. Perhaps, in the recent past, there had been no case of display of a Railway Coach in an Exhibition unconnected by railway track.

Readers will be interested to know how the coach was taken there as the same question puzzled every visitor to the Fair. One easily said, all the parts were brought by Lorry and the Coach assembled on the grounds, and another said that probably by laying track it was brought to the grounds and there were a million other guesses. But none of these had any relation to facts. The Coach was shunted upto Royapuram on the Southern Railway, beyond that, to a point nearest to the Island Grounds, on the Madras Port Trust Railway, from where the bogie consisting of the wheels and axles was removed, giant tyres fitted raising the Coach sufficiently high, permitting free movement alongside and on the curves *en route*. The Coach was then hauled by a heavy tractor and reached Island Grounds safely. On the spot at the grounds, the Coach was lifted up by jacks, tyres were removed, track was laid and, placing the bogies on the track, the shell was brought down on to the bogies and fitted. It was indeed a great engineering feat performed superbly under the able supervision of Mr. Debrass, AME/Plant.

At the Exhibition, the Integral Coach was one of the main attractions and every visitor to the Exhibition evinced a keen interest in the Coach. The visitors appreciated the amenities provided in a 3rd class coach and it was really a trying job for the demonstrators to explain to all of them how the Coach was brought to the place and to convince them that many such coaches are already on the line and that many more are rolling out of the I.C.F. at frequent intervals.

Besides the Coach, models of the Factory, the staff colony and a third class coach, with plastic roof with a view to keep the interior for view, were displayed in the adjacent Southern Railway Pavilion.

The Red Cross Exhibition was an interesting show, with a large variety of entertainments for children, such as the model train of P.W.D. that took visitors one full round covering the Fair. Giant wheels, merry-go-rounds, etc., were other attractions. Pavilions of Government Departments in the Centre, an open air Auditorium on one wing etc., were the other sights. The Science for Peace Pavilion of U.S.I.S. screened a film on how space satellites are being designed, constructed and launched. The model of the Vaigai Dam together with a

replica of the surrounding scenery put up by the P.W.D. was a feast to the eye. A look inside the model of an all-wooden typical Andaman house transported one straight to the Andamans. It is gathered that the cost of one such house in the Andamans is about Rs. 6,000. The H.T. 2 trainer of H.A.L. and the glider of the N.C.C. were very interesting. The various exhibits of the Defence Pavilion left a deep impression on the visitors on the vitality of our forces. The lousy pavilion of a Cigarette Company tempted one to join the large camaraderie of smokers, but the film on "Lung Cancer operation" screened beside in the Silver Hall and presented by the Voice of Prophecy, I.T.A., kept one back from rushing to join them.

A PICNIC TO POONDI



Graduate Apprentices of the Technical Training School are seen relaxing in a Park near Poondi Reservoir while they went on a picnic. Photo by S. D. Kingsley, Graduate Apprentice.

The Graduate Apprentices of our factory set out on a picnic for the first time to Poondi on Sunday, the 19th April 1959.

Starting by bus early morning at 6-30 a.m. from Broadway, the party reached Poondi at 9-00 a.m. The weather was pleasant through-

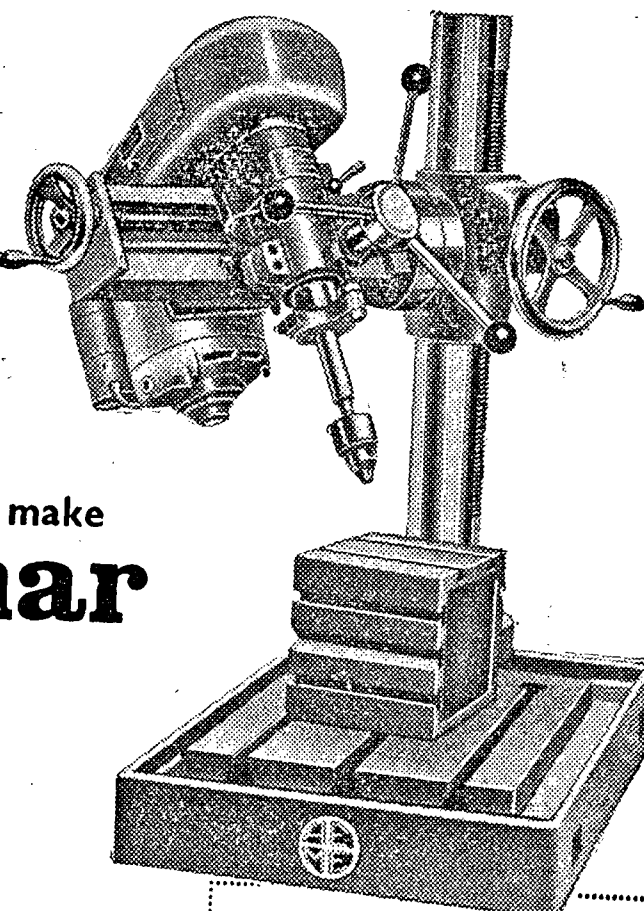
out the day but for a few showers during the bus journey to Poondi.

After having finished breakfast, the party set out on sight-seeing. The party left Poondi at 4-30 p.m. and reached Broadway at 9 p.m.

Indian make **Amar**

Universal Bench Radial Drilling and Milling Machine

This versatile machine, besides being suitable for use as a radial drilling machine, can be used as a high speed milling machine by use of end miller, and as a simple jig-boring machine.



Technical Data:

Drilling capacity in steel up to	3"
Maximum distance, spindle centre to column	21"
Travel of spindle	4"
Vertical adjustment of arm	27"
Range of spindle speeds 400/650/1,150/2,100	

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PREVENTION OF WASTAGE

Readers of "Railcoach" ought to be aware that a series of lectures have been instituted for the purpose of instilling a better sense of duty in employees of the factory who are in the supervisory cadre and preparing them properly for their responsibilities.

A lecture in this series recently delivered by Shri S. Arunajatai, W.M. II, is reproduced below.

"All of you know that by eliminating or reducing wastage, the cost of a Unit that is produced in a Concern could be made low and put on the market at a competitive rate. Each Production Unit has got its own peculiarities and we cannot precisely or conclusively say that wastage can be completely eliminated, but it is possible to reduce it to the minimum. We should study the types of wastages that may occur in a factory and plan how best we could eliminate them.

The following are a few types of wastages:

- I. Waste of time.
- II. Waste of ideas.
- III. Waste of materials and supplies.
- IV. Waste of Machinery and Equipment.
- V. Waste of manpower.
- VI. Waste due to accidents.
- VII. Waste of space.
- VIII. Waste due to idle machine hours.

I. Waste of time :

This may be due to—

- (a) Lack of proper planning on the shop floor, keeping workers waiting between jobs or waiting for materials, lack of knowledge of what constitutes a full day's work and not giving clear instructions to workers.
- (b) Failure to keep tools, supplies and portable equipment in proper places.
- (c) Ordering overtime work that could have been avoided.

- (d) Not seeing that men are supplied with proper tools and equipment for every job.
- (e) Allowing men to get to the habit of talking, roaming about and killing time.
- (f) Failure to get work started on time and slack supervision.
- (g) Delay in making decisions.

II. Waste of ideas :

- (a) Failure to listen and comment when workers offer suggestions.
- (b) Failure to get from new men helpful ideas which they may suggest from their previous experience.
- (c) Not consulting other sections.

III. Waste of materials and supplies :

- (a) Slack or inadequate supervision resulting in material getting spoilt.

This may be due to—

- (i) New men not being thoroughly instructed.
- (ii) New job to which men are not accustomed.
- (iii) Drawings/Sketches being torn or illegible or obsolete.
- (iv) Machines or Jigs being out of order, not adjusted or repaired.
- (b) Failure to issue clear instructions.
- (c) Improper and rough handling of materials.

- (d) Not paying attention to lighting on machines.
 - (e) Neglecting discipline among workers and thereby encouraging carelessness and off-quality work.
 - (f) Not tracing defective work that can be corrected immediately.
 - (g) Drawing more materials and supplies than necessary and not returning the surplus to Stores.
 - (h) Drawing less materials than necessary for the work.
 - (i) Scrapping materials that could be salvaged.
- IV. *Waste of machinery and equipment :*
- (a) Failure to inspect machinery, keep it in good condition and prevent breakdowns.
 - (b) Using large and powerful machines for small work
 - (c) Abusing small machines for heavy work
 - (d) Not protecting idle machinery from weather, dust, dirt, etc.
 - (e) Lack of periodical cleaning
 - (f) Failure to lubricate
 - (g) Failure to make needed repairs promptly to obtain maximum utilisation of installed capacity
 - (h) Under the name of economy to undertake to repair machinery that should be scrapped. In the end, this may cost more than a new one.
- V. *Waste of manpower :*
- (a) Keeping a worker on a job for which he has a violent dislike
 - (b) Failure to get full production as quickly as possible from new workers
 - (c) Permitting a man to remain at work when he is sick
 - (d) Keeping a man in a job for which he is physically or mentally unsuited
 - (e) Failure to train an understudy
- VI. *Waste due to accidents :*
- (a) Failure to recognise accident prevention as part of production work
 - (b) Failure to instal mechanical safeguards
 - (c) Poor housekeeping
 - (d) Failure to enforce consistently all safety rules and regulations i.e., allowing men to work without protective devices, such as gloves, goggles etc.
- VII. *Waste of space :*
- (a) Improper piling or storage of material
 - (b) Not paying enough attention to routing of materials
 - (c) Failure to keep the passages clear
 - (d) Keeping unnecessary materials at work places and thereby reducing the moving space
- VIII. *Waste due to idle man-hours and machine-hours :*
- This may be due to any one or more types of wastages explained above. Besides, poor planning on the shop floor will also cause a bottleneck, ultimately resulting in idle man-hours and machine-hours. If you carefully study the work load on each load centre and distribute the jobs, best results could be achieved.

SAFETY, THE FIRST CONSIDERATION AT YOUR WORKSPOT

BY

P. B. DAWSON, *Chargeman, Shop 41*

From the inception of an industrial undertaking, one of the most important things to be attended to carefully is the all-out drive to avoid accidents and reduce precious man hours that are lost annually on this account.

Safety as applied to procedures in an industry resolves into one's using good foresight and good judgment. No doubt modern machinery is equipped with protective guards and devices designed to protect the operator and make the operation of the machine as safe as possible. However, statistics show that these safety devices offer only 20% to 25% protection. Thus nearly 80% of all the accidents in the workshops are due to factors which cannot be guarded against by mechanical devices.

The principal factor accounting for preventable accidents is the human element. Most of the accidents are the result of someone's lack of foresight, carelessness or lack of considera-

tion for other workmen, and could in a large measure be avoided, if every individual acquires a habit of thinking a little before acting. Safety is achieved by earnestly striving to learn and follow the principles of *Safety First* at all times.

Safety First should be the password in the workshops, as injury sustained, however small, may lead to something serious. Workshops are places for purposeful activity where a worker has to direct his undivided attention to the job in which he is engaged. Do not divert his attention by play, needless conversation, shouting, whistling, etc. It is you, everyone of us, who should make our factory a safe place to work in. A place for everything and everything in its place : and if you find something that hinders safety, let your Supervisor know at once and do the needful to ensure safety. And lastly, 'Postpone your daydreaming unless you are at the Marina.'

Shri A. V. Subramanian,
our Personnel Officer.



Our hearty welcome to
Shri K. P. Ananthanarayanan, who assumed
charge as A.A.O. in the I.C.F.
on 29-5-1959.



AWARDS FOR SUGGESTIONS

The following staff have been issued commendations and cash rewards for the valuable suggestions offered by them and accepted by the Administration :

Sri M. D. Padmanabhan, B. Fitter, T. No. 518, Shop 23 was issued a letter of thanks for his suggestion for the publication of articles on the manufacture and design of light weight coaches, written by Sri Swarup, in a book form.

Sri N. Subramaniam, Supdt./Time Office (a) A letter of thanks was issued for suggesting an advantageous method of calculating the leave accounts of apprentices ; (b) He was commended for suggesting a standard self-contained form for applying for and sanctioning compensatory leave or rest.

Sri R. Gandhi, T. No. 113, Machinist, Shop 10, was given a cash award of Rs. 50 for suggesting a method for utilisation of scrap.

Sri S. K. Sengupta, T. No. 104, Machinist, Shop 10 was given a cash award of Rs. 50 for suggesting a method for utilisation of scrap.

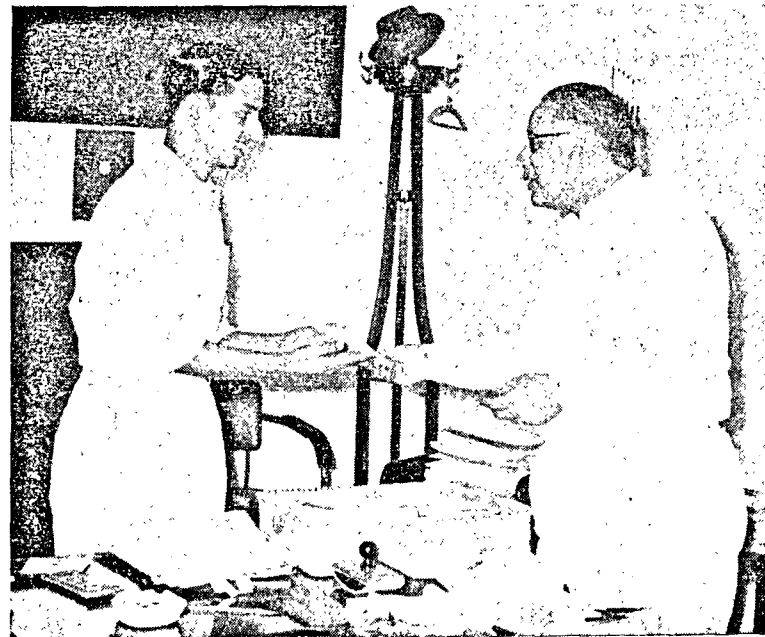
Sri D. Kesavan, Chargeman, T. No. 004, Shop 16 was given a cash award of Rs. 100 for his suggestion for an improved method of working.

Sri S. Vadivelu, Senior Clerk, Shop 41, was commended for suggesting a method to prevent fraudulent use of 'Lost' tool tokens.

Sri D. Subramaniam, Welder, T. No. 111, Shop 13, was given a cash award of Rs. 25 for suggesting a method for the utilisation of scrap.

Sri R. Bhaktavatsalam, Peon, CAOR's Office was commended for his suggestion to introduce postal Franking Machine in the Administration Office.

Shri K. S. Rajagopalan, Mistry, Shop 14, was awarded a sum of Rs. 200 on the 2nd September 1958 for his suggestion in connection with the use of raw material for the Entrance Hand Rail. Photo shows our CME, Shri K. Swarup, presenting the cheque to Shri Rajagopalan



AWARDS FOR BRAVERY

Sarvashri S. George and C. H. Narayana, welder apprentices, who were engaged on gas cutting work, displayed considerable presence of mind and acted bravely, unmindful of personal danger, in promptly closing the gas cylinder valves and putting out the flame that had shot up from a split in the gas pipe. The Chief Mechanical Engineer in appreciation of their brave act sanctioned a cash award of Rs. 50 to each of the apprentices.



Shri S. GEORGE, T. No. 13/803—Born on 12th May 1937 in Madras. Studied upto V Form in Singaram Pillai High School, Villivakkam, and successfully completed 18 months' training in welding in the Industrial Training Centre, Madras. Worked as a Welder in various Automobile Firms and joined the I.C.F. as a welder apprentice on 2nd November 1957. A hard and sincere worker. Plays Football and Hockey.

AWARDS FOR BRAVERY—(Contd.)



SHRI C. H. NARAYANA, T. No. 13/810—Born on 8th September 1939 in Badagara, North Malabar. Studied upto IV Form in C.A.H.H.M. High School, Madras, and successfully completed Fitters' course for 18 months in I.T.I. Madras. Worked for 3 years in H.A.L., Bangalore, as a Mechanic and joined the Merchant Navy as a Fireman and served in England, France and Africa. Joined I.C.F. as a welder apprentice on 21st May 1958. Plays Football and Volleyball and is interested in reading technical books.

GENERAL CARIAPPA SHIELD FOOTBALL TOURNAMENT

BY

A. D. PARTHASARATHY

The Inter-Departmental Football Tournament conducted this year by the I.C.F Sports Council is a happy forerunner for the forthcoming Inter-departmental tournaments in the I.C.F., in that a leading citizen of India came forward to donate a shield to encourage the sporting activities conducted by our factory. This is the first time in the history of the I.C.F. Sports Council that an Inter-Departmental Tournament for soccer for the General Cariappa Shield was conducted, and the game played was Booted Soccer with three backs.

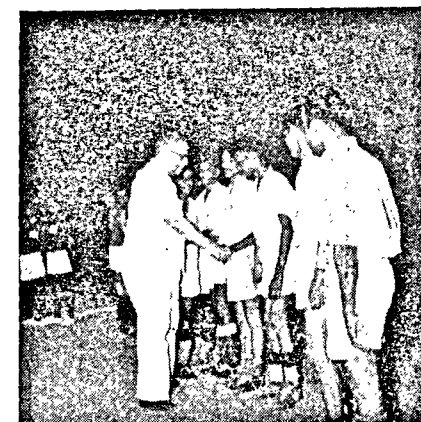
It should be placed on record that we of the I. C. F. have a deep sense of gratitude to General Cariappa for his noble gesture in donating a shield for conducting a tournament of this kind.

Thirteen teams participated in the tournament. It is worth mentioning that the I. C. F.

Sports Council trained 10 Football coaches and 8 referees among the I. C. F. Football Team players, who in turn trained the players in the various departments and shops. They thus contributed their mite towards the achievement of effective co-ordination and a sound system in playing a high standard of soccer. The referees that were trained controlled the matches in the tournament very effectively. The Coaches and Referees must be congratulated for carrying out their duties in an efficient and orderly manner.

The Finals were played in the I. C. F. grounds on 30-5-59. A team consisting of representatives of the 'B' shed and another consisting of representatives of the Mechanical

Shri K. Swarup, our Chief Mechanical Engineer, shaking hands with members of the successful 'B' shed team which knocked off the General Cariappa Shield.



Mrs. Swarup, wife of our C.M.E., distributed the individual cups for winners and runners-up and presented the General Cariappa Shield. Photo shows Shri A. C. D'Cruz, Captain of the 'B' shed team, receiving the General Cariappa Shield.

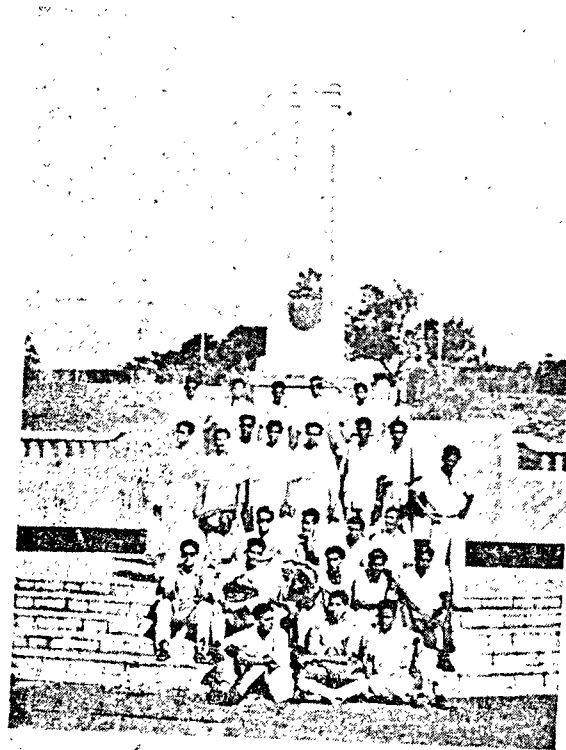


Offices reached the Finals. A large number of officers and staff turned up to see the game. The score board was blank during the scheduled full time and, only during the extra time permitted, 'B' shed was able to score two goals, the first one being scored by Joseph and the second one by David Martin in quick succession. The 'B' shop team was a well balanced one both in the matter of defence and offence. Ganapathy, Arumugam and Mohidoo played

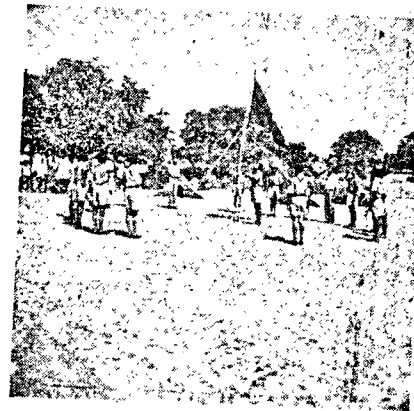
a marvellous game for the 'B' shed and Williams, Stephen & Jabbar Badsha played a nice game for the Mechanical offices team.

At the conclusion of the game, under the presidentship of our beloved Chief Mechanical Engineer and President of the I. C. F. Sports Council, Mrs. Swarup gave away the General Cariappa shield for the winning team and also distributed individual cups for winners and runners up.

Staff of Shops 10, 11 and 20 went on an excursion to Poondi on 18-4-59. The photograph was taken by Shri Simon Moniz, Chargeman, Shop 11.



Nineteen Rover Scouts of the Katta Bomman Rover crew of the Integral Coach Factory Scout District held a camp at Kasba island off Tada on the Madras-Calcutta line on the 26th and the 27th April 1959. Photo shows the scout flag being hoisted on the morning of the 27th April '59.



JUNE, 1959

AN EXCURSION TO GINGEE

The Fitter Apprentices of the Technical Training School/ICF, accompanied by their respective Instructors, made a trip to Gingee on the 9th May 1959. The trip was initiated by the Instructors under the Guardianship Scheme in the Technical Training School. The aim of the trip was mainly to enable the apprentices mix with their Instructors and discuss common problems freely which could otherwise not be done during working hours.

A crowded programme was drawn up for the trip to spend every minute available usefully. The concession of Privilege Ticket Orders provided by the administration for such trips was availed to reduce expenditure on transport.

Led by Shri S. Chandran, Chief Workshop Instructor, Shri K. Santhalingam, Workshop

Instructor/Fitters and Shri V. Ravindran, Workshop Instructor, the party got into the Cuddalore Passenger at Egmore Station. On arrival at Tindivanam, dinner was served to the party at the Udipi Hotel. After short relaxation, the party left for Gingee in special buses. The Travellers Bungalow at Gingee had been booked for the stay of the apprentices.

On the morning of the 10th May, after a sumptuous breakfast, the party left for 'Raja Gini' at 6-00 a.m. A trip was then made to 'Krishna Gini' otherwise called 'Rani Fort'.

Shri A. Krishnamoorthy and C. T. Ranganathan attended to the details of the trip and but for their unstinted co-operation the trip would not have been as pleasant as it actually proved to be.

VISITORS TO THE FACTORY

Baron W. Von Pochhammer, Former Consul-General for West Germany in India, visited the factory on the 2nd May 1959 and was shown round the Workshops and the Technical

Training School of the factory. He was very much impressed with the working of the factory.

On the same day Mr. M. C. Setalvad, Attorney-General of India, also visited the factory.

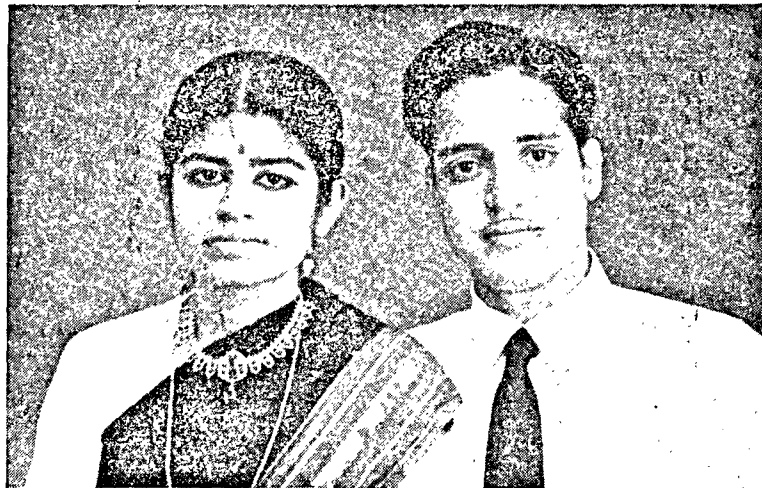
RAILCOACH



Our felicitations to Shri M. Kochappa Menon, Head Clerk, Dy. Cos's Officer, and Kumari P. Lakshmi Kutty who were married at Palghat on 9-5-1959

and to

Shri S. P. Rangaraj of the Accounts Department and Sow. Janaki who were married at Bangalore Cantonment on 10-5-1959.



Brain teasers

1. Some letter juggling with the name of a bird and the name of a quadruped resulted in the remaining letters leaving themselves to form a word. For an example, from DOVE and DEER the process was to cancel out the common letters—in this instance 'D' and 'E' only leaving O, V, E and R, from which either OVER or ROWE was formed. (Only one 'E' was cancelled as DOVE has only one).

Find out the names of birds and quadrupeds juggling which the following words were derived : (a) STEEL, (b) COAST, (c) MEW, (d) HERON, (e) HUS.

2. Four photographs of martyrs of freedom were shown to four candidates Jambu, Vembu, Sambhu and Thambu and they were asked to identify them. The photographs were labelled A, B, C and D. While Jambu, Sambhu and Thambu scored equally, Vembu could not stand up to them.

Their lists were as below—

Jambu : A-Kattabomman, B-Patel, C-Lajpat Rai, D-Pulithevan.

Vembu : A-Deysingh, B-Tatya Tope, C-Tilak, D-Pulithevan.

Sambhu : A-Kattabomman, B-Pulithevan, C-Tilak, D-Bhagat Singh.

Thambu : A-Deysingh, B-Tatya Tope, C-Tilak, D-Bhagat Singh.

Given that each martyr has been correctly named by at least one candidate, what is the correct list?

3. An inattentive boy in a class, when asked to simplify some fractions, simply cancelled the common digits in numerators and denomi-

nators but surprisingly obtained the right answer. If his answers were $1/4$, $2/5$ and $1/5$, what are the original problems?

4. How can ten coins be arranged on a table in such a way that they form five rows with four coins in each row?

5. List A below gives the names of certain plants and list B (not necessarily in order) gives the probable countries from where the plants originated. Pair them out correctly.

List A : Mulberry, Onion, Potato, Radish, Horse-chestnut, and Oats.

List B : Persia, Egypt, Tibet, North Africa, America and China.

6. Rangu and Vengu play a game in such a way that Rangu is to toss a coin until it falls head up at which time the game ends, and Rangu is to pay Vengu 2^{n-1} rupees where 'n' is number of tosses. Every time the coin falls the other way Vengu has to pay the stake amount. How much should Vengu stake in this game?

SOLUTIONS TO LAST MONTH'S TEASERS

1—37

2—Since the area of the inner triangle is $\frac{1}{4}$ th the outer, the probability is $\frac{1}{4}$.

3—10

4—The ages of Eena, Meena & Deeka are respectively 10, 7 and 3.

5—VIOLET, SAMPLE, QUAIN, ZEALOT, JUNIOR, HAMMER, PACKET, WINTRY, EFFIGY, AFRAID, SEXTON, BEHOLD and NEARLY.

6. $2/5$ th was grassland.

Wit and Whistle

1. The dentist was giving instructions to his clients, on the proper upkeep of teeth.

"Look. If you do just what I say, I'll bet your teeth will be as strong as mine. In fact I brush my teeth after every food and before going to bed."

But his eight year old son interrupted saying, "Papa, you have forgotten to say that you remove them and keep them in water before going to bed."

2. "You play a very nice game," said one of the participants in the game. "How long is it since you started playing?"

"Oh! Just since two hours, with you."

"It is wonderful. You are playing as if you are a master of it."

"I ought to; because it took me seven long years to learn it."

3. The Police Sergeant was asked in the interview by one of the officers:

"What steps would you take if you are unarmed and some one approaches you with a knife."

The puzzled candidate said "Long ones."

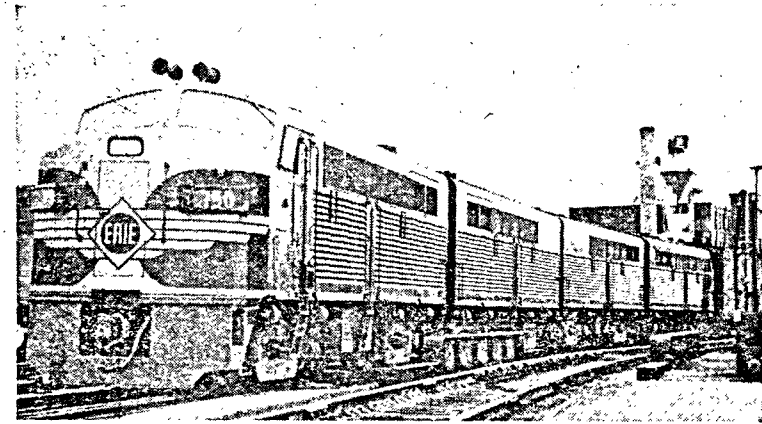
4. "How far is it to the next filling station," the driver asked the farmer.

"Not more than two miles, as my parrot flies."

"Well, how far is it if your damned parrot has to walk and push a car without fuel?"

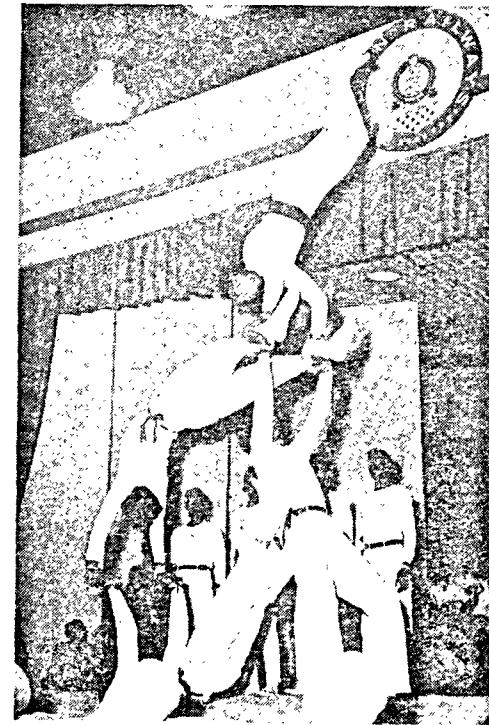
5. The farmer sold the surplus butter to the grocer from whom he used to purchase his provisions. On one occasion the grocer said, "Your butter was under-weight yesterday."

"How could it be?" said the farmer "Have you forgotten that I had borrowed your weight yesterday as my weight was misplaced."



General Electric's (U. S. A.) famed "rolling Railway Laboratory" just before two 1,200 horse-power units were retired in favour of a new experimental locomotive which will be thoroughly tested under actual operating conditions. (Courtesy—Globe Press Service.)

The Acrobatics team sent by the Integral Coach Factory participated in the Cultural Show at Delhi during Railway Week. They gave a thrilling performance at the Kishenganj Stadium in Delhi on 15-4-59. (Courtesy—Northern Railway)



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In the Cultural Show at Delhi during Railway Week in April 1959, troupes from various Railways participated and rendered it colourful. The Integral Coach Factory contributed a Moplah Dance. Photo shows the Moplah Dance sequence on boards. Photo courtesy Northern Railway.

The Cultural Show at Delhi during Railway Week was a cultural pageant of colourful variety. Photo below shows a railway team doing the Human Train! (Photo courtesy Northern Railway)

