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Rail Coach

Vol: 16



No. 5, 6.

Feb. 1960 March 1960

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RAILCOACH

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

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

Rates for Advertising

Per insertion

ORDINARY—

Full page	Rs. 100
Half page	Rs. 55
Quarter page	Rs. 30

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Front	(Not available)
Back	Rs. 250
Inside Front	Rs. 200
Inside Back	Rs. 200

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(i) Front inner cover	Rs. 150
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Blocks	Screen 100
Full page	8" x 5 1/2"
Half page	4" x 5 1/2"
Quarter page	4" x 2 3/4"
Cover page	Art paper one colour
Inside page	Imitation art paper

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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, the Union Deputy Ministers for Railways, the Chairman and Members of the Railway Board, etc.

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Integral Coach Factory, Perambur, Madras 23

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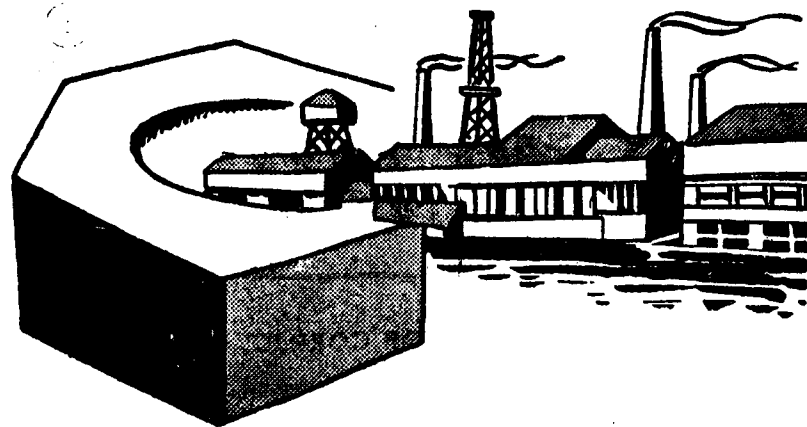
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RAILCOACH

(INTEGRAL COACH FACTORY MAGAZINE)

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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.

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Annual Subscription ... Rs. nP.
3 00

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COVER : "DUMMY HORSE DANCE"

—By Shri Stanley Macdonald

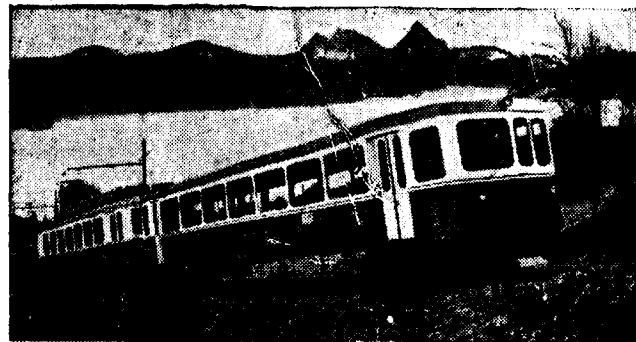
„ C. R. Swaminathan

„ Arnold D'Cruz

of I.C.F. Administration, in the
"AMATEURS NIGHT" at I.C.F. Open
Air Theatre.

Schlieren

The Swiss Car and Elevator Manufacturing Corp., Ltd., Schlieren-Zurich (Switzerland) is one of the pioneers in building and technical development of Railway Coaches, Tram Cars, Trolley Buses, Lifts, Escalators



editorial

It was a cheerful picture of the Railways that the Railway Minister Shri Jagjivan Ram presented to the Nation in his speech introducing the Railway Budget for 1960-61. The financial position of Railways continues to be sound. The unfavourable position of traffic trends which had manifested themselves sometime back have been successfully arrested. Railways have succeeded in a large measure in implementing their construction and rehabilitation programmes and are now in a position to go ahead rapidly with schemes of consolidation and expansion as an integral part of the national economy of the country.

There might be criticism from some sections regarding the increase in freight charges but it must be remembered that if Railways are to have the necessary resources to maintain themselves on the requisite state of efficiency they cannot afford to sit pretty on old fares, without regard to the phenomenal rise in expenditure. The revision should therefore be viewed in this context. The *status quo* in respect of passenger fares will be universally welcomed.

The main emphasis in the Railway Minister's speech was, as might be expected, on passenger amenities. Railways have been devoting very great attention to this subject and efforts continue to be made on all zonal Railways to co-ordinate passenger amenity works.

We have no doubt that Railway men all over the country will continue to give of their best in maintaining the high traditions the Railways have built up and we in the I.C.F. propose to work with the same team spirit, harmony and *esprit de corps* as we have done so far and thus achieve the targets laid down.

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RAILCOACH

DO YOU KNOW?

THAT during the Bengal Famine of 1874, when transport was the greatest expediency, each day saw the construction of one mile of railway line. Laying the track from Chamta Ghat to Darbhanga—a distance of 52 miles—began from February 23, 1874. The first train passed over it on April 17 just after 53 days.

* * * *

THAT India has about 50,000 miles of railway track—roughly one-fifth the distance from the earth to the moon. The route mileage, however, is about 35,000 which is eight times the length of the world's longest river—the Amazon in South America.

* * * *

THAT scientific intensive scheme of production was introduced on a phased programme, in December 1954 at the Chittaranjan Locomotive Works. Of the total 4,708 persons working in the works at present, 3,587 are operating under this scheme.

* * * *

THAT between January and August 1959, the number of passengers detected without tickets, was 55,04,657. An amount of Rs. 1,23,75,583 was realised from them. The maximum number detected was on the Eastern Railway, 12,03,247 and the amount realised from them was Rs. 27,91,623.

* * * *

THAT the alarm chains were pulled 45,220 times between January and October 1959 on all the Indian railways, of which 38,073 cases were unjustified. To combat the ever-increasing evil of alarm chain pulling the apparatus had to be kept blanked off on 838 trains, throughout the Indian railways. The maximum number of trains, 571, were on the Eastern Railway.

* * * *

THAT the total sale proceeds on account of departmental catering on the Indian railways rose from Rs. 53.52 lakhs in 1955-56 to Rs. 206.24 lakhs in 1958-59.

President of U.S.S.R. Visits I.C.F.

Marshal Voroshilov, the Chairman of the Presidium of the Supreme Soviet of the U.S.S.R. and party visited the Factory on the evening of the 30th January 1960. On arrival the distinguished visitor was garlanded and then the principal officers of the Factory were introduced to him. His Excellency accompanied by the Soviet Deputy Prime Minister and the Deputy Foreign Minister, then inspected almost all the sections of the Factory, and opined that this was "big and modern." The distinguished visitors were cheered by the workers as they passed through the various sections. The Marshal then finally inspected a finished integral coach ready for service and wished that "India would have more of such factories." The distinguished visitors were then shown round

the Basic Training Centre of the Technical Training School when Mr. Kuznetsov, Deputy Foreign Minister spoke to some of the apprentices and made kind enquiries about their work. They were also driven through the residential colony of the factory. Marshal Voroshilov, amidst the oration of the colony children got down from the car and inspected the house of an unskilled worker. At the conclusion of the visit Marshal Voroshilov and party arrived at the T.T.S. and the Marshal was presented with an attractive silver replica of a coach as a souvenir. President Voroshilov said in conclusion that he had seen a fine and wonderful enterprise. His Excellency "wished the workers in the factory happiness and great success in future."



"Long live friendship between our two great countries and long live peace throughout the World"—President Voroshilov.

Speech delivered by His Excellency Marshal Voroshilov, Chairman of Presidium of U.S.S.R. on the occasion of his visit to the Integral Coach Factory.

DEAR FRIENDS,

We have seen your very fine Factory. It is a wonderful enterprise and we could see this ourselves even though we paid a brief visit throughout the Factory by car. We saw that this was a big industrial modern Factory, and we felt the heart beats of the people who work here. This was due to the fact, that from time immemorial, friendly co-operation, brotherly friendship, has established itself between India and Soviet Union, and for which reason, we felt the brotherly hospitality of your people here in this Factory, and our hearts beat in unison. We want to wish to your people, to all those workers who work here, all the happiness, all the best and great successes in the future.

Both our countries, your very great country and ours,—and all the other countries of the

World, Asia, Africa and other continents, must do all in their power to prevent the outbreak of a new war. Only then, on that condition, can you achieve prosperity and happiness. Therefore, we should all work hard, but we must not forget at the same time that we all need to display vigilance, so as not to allow the outbreak of any new conflict. Neither India, nor Soviet Union wants this to happen, and if peace is ensured then India will certainly achieve such tremendous progress in the future that even this level you have already achieved will be something that will go down into the remote past and will only be remembered as the stage that has been passed. So, may I say, *Long live the friendship between our two great countries, and long live peace throughout the World!*

FEBRUARY, 1960



President Voroshilov visited the house of Sri. Rahim, Ferro Printer, I.C.F.

The following were some other important visitors to the factory :—

Name	Date of visit	Impressions
1. 24 members of a Parliamentary Delegation from Nepal led by Shri Krishna P. Upadhyay.	2-1-60	"It is simply exciting."
2. A group of members of Parliament, New Delhi who are on a study tour of South India.	7-1-60	"Our visit has been rewarding. We are very much impressed by the production figures which have in so short a time surpassed the target laid down. We have had a round of the staff colony. We are also impressed by the welfare measures adopted by the management."
3. Members of Public Accounts Committee of the Lok Sabha, New Delhi.	9-1-60	"Very Good."
4. 300 delegates who attended the All India Women's Conference at Madras City.	25-1-60	"It was a most interesting and instructive visit to I.C.F. which tells us a saga of Industrial Co-operation."

RAILCOACH

WHAT IS NEWS AND WHY

Third class sleeper coach on every long distance train—Railway Minister announces long-term objective

The Railway Minister, Shri Jagjivan Ram, said in Lok Sabha on the February 17 that the Railway Ministry had decided as a long-term objective to provide at least one sleeping coach for third class passengers travelling over 500 miles in every long distance train in the country without the levy of any additional charge.

He said that a start had already been made on the Madras-Howrah Mail and the Delhi-Bombay Central Express with sleeper coaches of a new design which had as many berths as seats, and orders had been placed for the construction of 200 more broad gauge and an equal number of metre gauge sleeper coaches of the same design. As these coaches became available, the sleeper service would be extended to more trains.

Rs. 20 crores provided in 1960-61 for Pay Commission recommendations

The Railway Minister announced in the course of his Budget speech in Lok Sabha on February 17 that the implementation of Government's decisions on the Pay Commission's recommendations would cost the railways about Rs. 13 crores annually.

He said that a provision of Rs. 20.12 crores had been made in the 1960-61 Budget to cover the period from July 1, 1959 to March 31, 1961.

The Minister said that special machinery had been set up to do the work in connection with the implementation of the recommendations as expeditiously as possible.

Greater self-sufficiency in Rail Equipment—"Show Room on wheels" to visit industrial centres

A three-coach mobile show room on wheels was now under construction, and it would be

taken around industrial centres in the country to indicate the requirements of rail equipments to manufacturers said the Deputy Minister for Railways, Shri Nawaz Khan in Lok Sabha on the February 10.

The Deputy Minister who was replying to a question by four members during question hour, said that although steam locomotive boilers, coaches and other frames had to be ordered from abroad during the first year of the Second Five-Year Plan, "for all this equipment we are now self-sufficient." He said that imports were now confined to specialised equipment only such as A.C. electric locomotives, electrical gear for electric multiple unit stock, diesel locomotives and some other minor items. Arrangements for the indigenous manufacture of these items also were being progressed.

Hill station rail concessions announced

The Railway Board has decided that, as in previous years, concessional hill station return tickets at one and a half single journey fares should be issued for the hot weather during this year also, with effect from April 1, 1960.

These concessional tickets will be available for the first, second and third classes, for completion of the return journey within a period of three months from the date of commencement of journey. Booking in advance will be permitted as usual so as to facilitate reservation of seats or berths.

These will be issued from all stations from which the distance is 150 miles or more, to Pathankot, Simla, Solan, Dharampore (Punjab), Dehra Dun, Kathgodam, Darjeeling, Kurseong, Shillong, Abu Road, Pipariya, Ootacamund, Coonoor, Kodaikanal Out-Agency (served by Kodaikanal Road station at one and a half

single journey fares for the rail portion plus two single journey fares for the road portion) and Kotagiri Out-Agency (served by Mettupalayam at one and a half journey fares for the rail portion plus two single journey fares for the road portion).

The tickets will be subject to the usual conditions regarding break of journey, reservation, dating of return journey tickets etc., as in previous year.

In the case of concessional return tickets issued to Dehra Dun, the holders will be permitted to break journey at Haridwar either on the outward or on the return journey, but not on both the journeys.

Pay Commission recommendations concerning railwaymen—"utmost sympathy and consideration" assured

Shri S. R. Vasavada, President, National Federation of Indian Railwaymen, met the Chairman and Members of the Railway Board in New Delhi on February 4 and explained to them the reactions of railwaymen to the recommendations of the Central Pay Commission and the decisions announced by Government thereon.

After full and frank discussion, he was assured by the Railway Board that the problems relating to railwaymen would be dealt with, with utmost sympathy and consideration. An early meeting will be held between the Railway Board and the National Federation of Indian Railwaymen.

Monthly Outturn

	Target	Actuals
January 1960 ...	30	38
Cumulative total for the first ten months of the year 1959-1960 (Financial) ...	293	366

NEWS FROM SWITZERLAND

A new Swiss sewing-machine

A well-known Swiss firm has just placed on the market a new sewing-machine for industry and the trade, called "Bernina kl. 217." This is a big machine for straight sewing and for zigzag stitching, which is distinguished by the large size of the zigzags and the maximum length of the stitches, both of which can attain about 0.236 inches. When doing zigzag stitching, the machine accomplishes 2700 revolutions per minute. This machine is specially intended for tailors and dressmakers, as well as for the industries which manufacture ready-to-wear clothes and underwear, and it should prove of great value, in that it makes it possible to perform all the work required for the making of clothes, such as over-stitching, button-hole stitching, the sewing of buttons, hooks, etc., as well as doing piping in various widths, making ornamental stitches and various kinds of seams, edges, etc.

A revolutionary new electric cooker

A Swiss firm in Schwanden, which specialises in the manufacture of cooking apparatus, has launched a new type of electric cooker which has revolutionised house-keeping technique. Taking into account the fact that nowadays kitchens are apt to be very small, the new Therma cooker has got its two, three or four plates (as the case may be) arranged, not in the shape of a square, as is usual on the classical type of cooker, but in a straight line; this arrangement considerably reduces the space for this cooker. Moreover, when not in use,

it is possible to tip back the plates into a vertical position, when detachable bowls, made of stainless steel, will be found under them, which can be used for the preparation of dishes. Being provided with a perforated cover, these bowls are also useful for draining vegetables; a board can also be placed over them, if there is any chopping or mincing to be done. As for the plates these are mounted on tubes placed at the same level as the plate when it is in use; these tubes form a kind of grating on which pots and pans can be placed after the cooking has been done. This electrical cooker is covered with a plastic substance which matches the colour of the kitchen.

New road signs for winter motoring in Switzerland

When required by road conditions two new signs are set up. They both show a tyre. A whole tyre with snow chains means that snow chains are compulsory. A tyre showing one half with snow chains and the other with a snow tyre profile means that snow tyres or snow chains are compulsory.

A giant screen

On the 15th of January 1960, took place in Zurich, the first public projection of televised images, in the unusual size of about 645 square feet. This show, which was realised by means of a Swiss apparatus, the "Eidophore," was thrown on a screen that could be taken to pieces and had no visible seam or joint. This screen, the biggest of its kind in Europe, was manufactured by a Swiss firm.

RAILWAY BUDGET

PROPOSALS

FOR 1960-61



Shri Jagjivan Ram

Presenting the Railway Budget for 1960-61, the Railway Minister, Shri Jagjivan Ram, said on February 17 that the revenue surplus for the coming year, after meeting the large commitments arising from the Pay Commission's recommendations etc., would be about Rs. 4.5 crores on the basis of existing fares and freights. He announced that with effect from April 1 this year a supplementary charge of five naye paise per rupee would be levied on freight of goods and coal traffic, excluding export ores, military postal and the railways' own traffic. The anticipated yield would be about Rs. 14 crores per year. Apart from this, the Railway Minister announced no change in the existing fares and freights.

A surplus of Rs. 4.5 crores was shown, the Minister said, after an allocation of Rs. 20 crores in the coming year for implementing the recommendations of the Pay Commission for a period of twenty-one months since July last year. For implementing these recommendations, the Railway would have to spend about Rs. 13 crores a year. The Railway

Minister estimated the gross traffic receipts for the next financial year at over Rs. 464 crores. This showed an increase of nearly Rs. 42.5 crores over the current financial year's revised estimates. The total expenses were placed at a little less than Rs. 389 crores. This left a gross surplus of Rs. 75.70 crores. The contribution to the General Revenues was placed at more than Rs. 57 crores.

Achievements and Targets

Second Plan: The first four years of the Plan, the Railways would have spent about Rs. 872 crores out of a total allotment of over Rs. 1,100 crores. In terms of physical targets, the Railways would have completed a doubling of nearly 700 miles of railway line and opened about 600 miles of new lines, with equal mileage in various stages of construction. The rolling-stock fleet would have increased by 14 per cent in locomotives, 27 per cent in wagons and more than 15 per cent in coaches. A number of new lines in steel and coal belts had been completed in time to feed the raw products

into the steel plants. The Railways expected a saving of about Rs. 80 crores in foreign exchange in their Second Plan allocation. Developments in the Third Five-Year Plan of the railways, hinged upon the transport needs which will emerge out of the agricultural and industrial growth.

Self-sufficiency: Self-sufficiency had been the keynote of the policy pursued by the Railways. A steel foundry of 7,000 tons capacity was being set up at Chittaranjan Locomotive Works with a provision for expansion to 10,000 tons. The Chittaranjan Locomotive Works were expected to turn out 173 Locomotives during the current year. Telco was likely to deliver 100 locomotives in the current year and the same number in the following year. A stage had been reached when we could enter the export market as regards steam locomotives. In respect of wagons and coaches also, India was self-sufficient and could build for export.

Passenger Amenities: During 1958-59, 170

new trains were introduced and the run of 85 trains was extended. During the current year, up to December 1, 1959, 178 new trains had been introduced and the run of 118 trains was extended. A start had been made in providing sleeping accommodation to third-class passengers travelling over five hundred miles without any additional charge. The construction of 200 more broad gauge sleeper coaches and an equal number of metre gauge coaches of the new design had been ordered for this purpose.

Amenities to Staff: During the first three years of the Second Plan, 36,000 staff quarters had been constructed and 9,000 were expected to be added during the current year. Provision for another 10,000 quarters had been made in 1960-61, bringing the total to 55,000 quarters during the Plan period. It had been decided to allow full remission of fees in primary classes to children of railway employees in all Railway Schools, where the medium of instruction was in Indian language.

SAYING THANKS WITH CASH

An Agra citizen travelling by rail from Howrah to Tundla recently suffered a serious heart attack at Gaya and was given medical attention by railway doctors at five stations during the rest of his journey.

In a letter now received by the Railway Minister, Shri Jagjivan Ram, this passenger, Shri Raj Narain Agarwal of Belanganj, Agra, has requested the Railway Minister to enlighten him about the procedure whereby he could express his gratitude "with a little cash" to the train staff and railway doctors who made it possible for him to travel to his destination despite his serious ailment.

Hindi Vidyarthi Mela



Photograph taken on the occasion of the Celebrations

The Hindi Prachar Sabha, Perambur celebrated Hindi Vidyarthi Mela at the I.C.F. Institute Hall on the afternoon of 10th January 1960. Over 150 students participated in the Mela. Sri O. V. Alagesan, President, Tamilnad Congress, presided.

After light refreshments to students were over, various competitions were held for students of different standards.

Thereafter, Sri K. Swarup, Chief Administrative Officer, I.C.F. and President of the Sabha, welcomed the gathering. He praised the work of the D.B.H.P. Sabha in the propagation of Hindi in the South over the last several years.

Sri M. Satyanarayana, M.P., in his speech said that every Indian should necessarily know two languages, one the mother-tongue, and the other Hindi—the National language. He also said that the Government of India had given a van to D.B.H.P. Sabha for Hindi propagation work in the South.

Sri Alagesan, in his address laid stress on the need for every Indian to have a working knowledge of Hindi, English being given a place next to Hindi in the curriculum of studies. He also appreciated the work the Sabha is

doing for Hindi Prachar. Later Sri Alagesan also inaugurated the Propaganda Van.

Sri Chandramouli, Secretary of the DB.H.P. Sabha, Tamilnad, addressing the students emphasised that apart from passing examinations, they should create a Hindi atmosphere by getting conversant with the conversational style of Hindi. He also added that every one in the South should equip themselves with a working knowledge of the language so that they may not repent at a later stage.

Sri Venkateswaran, Secretary for Examinations, D.B.H.P. Sabha next distributed certificates and also prizes to successful students who took part in the competitions held earlier in the day. He also reminded the students that the Sabha's syllabus for the various examinations is designed particularly to suit South Indians and the Government of India and the State Governments have recognised these examinations.

Sri H. Balasubramanian of Madras City College also spoke. Srimathi V. Swaminathan proposed a vote of thanks.

The celebrations concluded with a dance recital by the students of Bharatha Natya School, Purasawalkam.

MAINTENANCE WELDING

BY

S. V. NADKARNI, M.Sc., A.M.I.W.

(Published through the kind courtesy of *advani-oerlikon Ltd*)

Introduction

The immense possibilities of welding as a means of reclaiming worn out or broken metallic parts are not always fully realised by the maintenance engineer because information on welding metallurgy and the range of welding materials necessary for his purpose are not made readily available to him.

In India, the recent restrictions on import of spare parts among all other engineering materials have induced the maintenance engineer to explore every possibility of prolonging the life of metallic components subject to wear and tear and failure by fracture in service. While correct choice of welding materials and procedures can convert many an unserviceable component into one as good as and even better than a new one, inadequate knowledge and faulty procedures will reduce it to scrap.

Know your material

Before taking up a part for reclamation by welding, one must know the composition of the material. It may be mild steel, high carbon steel, a high alloy steel, austenitic manganese steel, or cast iron. Even when it is cast iron, it may be ordinary graphitic or malleable or in a chilled state to give a hard and wear resistant exterior. A steel part may have undergone a carburising or nitriding treatment during its preparation or may have been supplied in a particular hardened and tempered condition. A complete history of manufacture of the part must be known and the requisite information must be made available to the maintenance engineer by the manufacturer of the machine concerned. Unfortunately, such information is not always readily forthcoming from the manufacturer who is naturally more interested in the turnover of his spare parts than in the

economical maintenance of his machines at the customer's end. Moreover, the manufacturer rarely designs his vital parts with an eye on the possibilities of their simple reclamation by welding. For example, many important parts in a grinding mill or a batching plant are made of high-carbon high-chromium steel or high alloy steels which are later carburised, though such materials cannot be welded normally without causing cracking. They could have been designed out of mild steel with outer surfaces built up with suitable hardfacing electrodes.

Again many important parts are made of cast iron because this material is cheap and readily machinable. However, cast iron parts make an economical proposition only when they can be readily cast in a local foundry as and when required. But when it comes to building them up to correct dimensions or repairing fractures because of non-availability of spares, practical difficulties arise because cast iron is very likely to crack in the region next to the weld and the weld is non-machinable unless a very expensive nickel or nickel alloy electrode is used. Often the material is chilled cast iron in which case the exterior shell has a wear resistant but hard and brittle—martensitic structure that cannot tolerate the slightest welding heat.

Mild steel

From the maintenance engineer's point of view metallic components and spare parts should as far as possible be made of mild steel. Not only is this material very easy to weld (without the necessity of heat treatment), but a variety of surfaces can be deposited on it according to the service conditions required to be met. The commonest hardfacing elec-

trodes for mild steel are those which deposit molybdenum-chromium air-hardening steels of Brinell hardness 250, 350 and 650, commonly designated No. 1, No. 2 and No. 3 respectively. The first one gives a machinable deposit and can therefore be used for building up the teeth of gear wheels; the second one gives a deposit machinable only with high speed cutting tools and is ideal for rails and crossings; while the third one gives a very hard deposit that can only be ground and is used for making cutting edges for shears or for surfacing oil expeller worms. The deposit from this last type is too hard and brittle and is likely to crack when laid on a big component which causes severe quenching of the deposit, unless the component is preheated to around 150°C.

Where abrasive and corrosive conditions exist, the mild steel part can be surfaced with a stainless steel electrode giving an austenitic martensitic deposit of Brinell hardness 300–400. An electrode is also available for depositing high speed tool steel on mild steel which is ideal for making cutting tools on mild steel shanks. But here a careful heat-treatment is necessary for conditioning the tool steel deposit.

An important point to be borne in mind when hardfacing a part is that such a part may wear out a softer surface against which it is in sliding or friction contact. The obvious remedy is to hardface the opposite surface to the same degree of hardness.

Heat treatment

Special precautions including suitable heat treatment are necessary when building up parts other than mild steel by welding.

Steel castings and forgings containing about 0.3 per cent carbon require a minimum preheat temperature of 100°C. The surface of the casting should be free from dirt, grease and sand, and in any case any surface to be welded must be as clean as possible. Common hardening steel containing 0.40 per cent carbon requires a minimum preheat temperature of 200°C, while carbon steel rails and laminated

springs of 0.5 per cent carbon content require a minimum preheat temperature of 400°C.

Case-hardened mild steel parts may have an outer case of up to 1/16" thickness with Brinell hardness above 650 and containing 0.9 per cent carbon. When welding is done directly on this hard case, cracking of the base material is inevitable. The hard surface must be removed by grinding or by annealing followed by machining, and then the inner surface having Brinell hardness of about 150 can be surfaced with electrodes described in the previous section on mild steel.

Low alloy steels which are not subject to air hardening may contain 0.25 per cent maximum carbon, 1.5 per cent maximum chromium, 1 per cent maximum molybdenum and 3.5 per cent maximum nickel. Such steels require a minimum preheat temperature of 250°C. If the carbon content is above 0.25 per cent, the article may have to be preheated to 400°–500°C. and maintained in this state until welding is completed and finally cooled slowly under cover or in dry insulating powder.

For hardfacing the above materials, it is advisable to first give a buffer layer with a low-hydrogen type electrode giving a tough and ductile mild steel deposit and then further hard layers with either of the No. 1, No. 2 and No. 3 electrodes described in the section on mild steel.

Parts are sometimes made of nitriding steel containing up to 3.5 per cent chromium, 0.7 per cent molybdenum and 1.3 per cent aluminium. When this material is heated in ammonia gas at about 500°C. for 50 to 80 hours, an extremely hard case of about 0.010 in thickness is formed. Obviously the hard case must be ground out and the object preheated to 400°–500°C. before welding is commenced. It should be finally cooled slowly under cover.

Parts which are subject to heavy impact and abrasion such as stone crusher jaws are best made of austenitic manganese steel i.e., steel containing at least 12 per cent manganese. This steel which is obtainable only in the cast

form has an initial Brinell hardness of below 200 which rises under the influence of heavy impacts to about 550 Brinell with a corresponding increase in yield and ultimate strength. This property is called work hardening. Parts made of austenitic manganese steel thus a work hardened exterior which is martensitic in structure and therefore brittle and magnetic (austenitic manganese steel is originally non-magnetic). Before welding, this surface must be removed by grinding or with a gas cutting torch and then the soft internal surface must be built up using an austenitic manganese steel electrode. Welding should be in small intermittent beads that will not allow the material to get unduly hot as there is likelihood of austenitic structure being converted by overheating to hard and brittle martensitic structure. Under no circumstances should a mild steel or alloy steel deposit be laid on austenitic manganese steel or an austenitic manganese steel deposit on mild steel or low-alloy steels. A very brittle zone is formed at the junction of the base material and the deposit which gives way in service.

Cast iron parts can be repaired or surfaced with a special mild steel electrode provided the casting can be heated entirely to at least 550°C. and maintained at that temperature until welding is completed and finally cooled slowly under cover. The weld metal in this case will be hard and non-machinable. Local pre-heating of cast iron should not be undertaken as this will cause serious contraction stresses and subsequent failure in service. Where preheat is not possible, a special monel or nickel electrode is used and welding heat is kept to the barest minimum. The monel or nickel deposit amalgamates very well with cast iron and is very soft and machinable. The nickel electrode is also for building up a stable and corrosion-resistant surface on the inside of cast iron pumps handling corrosive liquids.

Designing the deposit

Hardfacing deposit must be thoughtfully laid at the point of wear not only for economy

but for maximum efficiency. Badly designed deposits crack and spall very easily or do not last. For example, a hammer used in a crushing mill is subject to wear at the tip and is usually surfaced as shown in Fig. 1 (a) with the resultant cracking as shown at (b). Correct design of the deposit should be as at (c). Notice here how economy is coupled with efficiency.

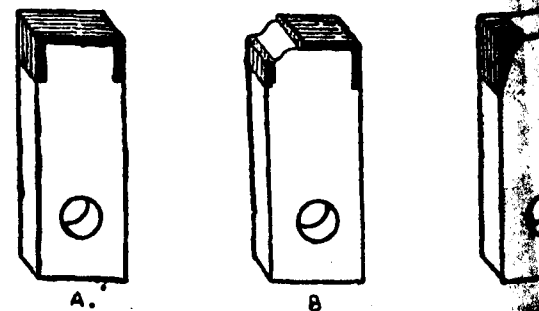


Fig. 1
Crushing Hammer A-incorrect. B-After use. C-correct.

The hardfacing deposit being usually hard and brittle, it must be laid as far as possible in a carefully prepared groove. A groove such as in Fig. 2 (a) may be necessary for laying a hard cutting edge on a sheet blade which is subjected to shock. For angled surfaces such as tappet valve faces, the groove should be as in Fig. 2 (b). For flat work where rubbing surfaces must be finished off to an existing level, the groove shown at (c) is recommended. Such grooves help deposition of an economical quantity of deposit exactly at the spot desired.

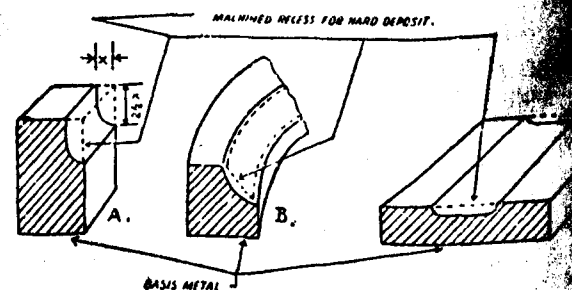


Fig. 2

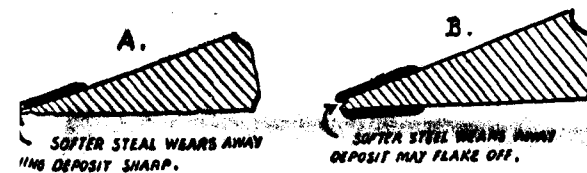


Fig. 3

Often surfacing only on one side instead of both the sides is more efficient as in the case of the excavator teeth on an earth-moving equipment. See Fig. 3 (a). Here the softer base metal wears away more rapidly than the deposit which is consequently left standing proud. In the case of Fig. 3 (b), the deposit is very likely to break off.

It is wrong to suppose that the thicker the deposit the longer will be the life of the surface. A thick deposit is more susceptible to breaking

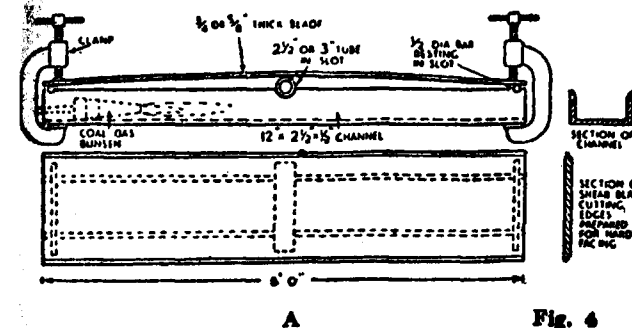


Fig. 4

off in pieces than a thin one. Where a large section is to be built up, most of it can be effected with a low-hydrogen type mild steel electrode and finally 1/4" thick hardfacing deposit can be given.

Control of Distortion

Distortion is an inevitable feature of welding and ingenious means have to be used to control it, especially where long welds are made. A classic example is the fabrication of a 8 ft. long guillotine shear blade out of mild steel with the cutting edge prepared from No. 2 or 3 hardfacing electrode depositing chromium-molybdenum air-hardening steel. Two edges are prepared simultaneously while the blade is pre-bent as shown in Fig. 4 (a), while a particular welding sequence as shown in Fig. 4 (b) is followed.

Fabricating a high-speed cutting tool

An electrode which deposits high speed tool steel can be used to fabricate a cutting tool on a mild steel shank. A recess is prepared on a mild steel bar as shown in Fig. 5 (a) and the deposit is laid in it. The deposit is finished to the shape as in (b), (c) and (d) by grinding.

In order to obtain a most efficient cutting edge the following procedure is recommended :

- Preheat the bar to 600°-700°C.
- Weld.
- Cool in air (finally in air blast).
- Grind.
- Oil quench from 1280°C.
- Temper at 560°C. for one hour.
- Grind to finish.

Conclusion

It is impossible to deal fully with this important subject in a brief article. Advice can be

readily sought on choice of electrode and correct welding procedure from manufacturers of electrodes and welding materials. It is hoped that maintenance engineers will take more scientific interest in the subject of welding and introduce proper welding techniques in their works for increasing the running efficiency of their machines and equipment.

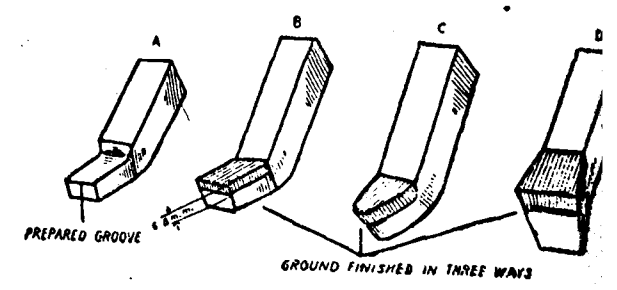


Fig. 5

CORROSION AND ITS PREVENTION

BY

DR. G. MUKHERJI, B.E. (CAL.), DR. ING. (AACHEN)

Every metal tries to convert itself to its original stage, *i.e.*, to the ore form which it has been extracted. As for example, the steel is extracted from iron ore "Hematite," which is nothing but higher oxide of iron and steel in turn converts itself to its oxide by the process of corrosion. It may be defined that the destruction of metal by Physico-chemical or Electro-chemical action is known as corrosion. Oxidation is the main factor which causes corrosion. As the affinity of different metals to oxygen varies, the rate of corrosion also varies with it. In general, the greater the affinity of oxygen, the lower will be the rate of corrosion, which may appear to be just contradictory to the theory of corrosion by oxidation. But a few examples will make the idea clear *viz.*, chromium has got higher affinity for oxygen compared to that of iron. It means that chromium will oxidise preferentially if chromium and iron are placed side by side. But once the oxygen film is formed on chromium, the film is so dense that further diffusion of oxygen is not possible, which stops further corrosive action on chromium. Metals like gold, silver, copper, aluminium etc., behave in the same way. Contrary to this the oxidation of iron which forms a very thin and porous accentuated film through which oxygen diffuses and further corrosive action takes place. Anodising is a bright example for this, where the aluminium is anodised to protect the aluminium and the process is nothing but artificially oxidising the surface of aluminium which will protect a further diffusion of oxygen through this film. But, if by some means or other the film is destroyed, the oxidation and corrosive action will proceed further. The electro-chemical action will proceed further. The electro-chemical action of corrosion may be same where iron or any metal is dipped in water. Here

the corrosion takes place by the exchange of electrons between water and metal concerned, and a local galvanic surface cell is formed, which initiates corrosion.

Thus, to prevent corrosion, there are two methods—first to select a suitable base material like aluminium or chromium or stainless steel, which will protect by itself or to use a corrosive base metal and prepare the surface such as to isolate it from the corrosive chemicals. Accidentally as steel has got strength and abundant supply is available, it is considered cheaper for constructional purposes to use steel instead of alloy steels like stainless steel—Thus as the steel is becoming easily available and economical for fabrication, it is universally used for constructional purposes. The laboratory experiments have shown that when ordinary mild steel is compared with the steel bearing copper in the region of 0.20 to 0.30 per cent, the latter gives 10 times protective power against corrosion. Hence, the thinner sections of our coaches are of mild steel with copper content in the region of 0.30 per cent. Since, as mentioned above, some metal has got greater resistance to corrosion compared to other, one of the effective methods of keeping steel away from the corroding agents is to use a metallic coating. The two main protective elements so far tried are Zinc and Aluminium. The method of application has secondary influence on the degree of protection. Thus, there is a little to choose between various methods of electro-diffusion or metal spraying or hot dipping. To choose the proper method of application is to suit the particular administration or organisation. But from the practical engineering point of view, the protection is more important than base metal. The cheapest method of protecting steel against corrosion is by painting at regular intervals.

If painting is adopted, it is vital to keep a close watch on the painted structures.

Among the inhibitive priming paints, red lead is not used due to its toxic nature and also long drying time. Zinc Chromate Primer is extensively used in America for aluminium and steel surfaces. In recent years, Zinc Dust Primer is also used as corrosive inhibitor. The Zinc Rich Primer to be effective should contain at least 95% by way of zinc in dry paint film. The Zinc Rich Primer with plasticised polymerisers have the most astounding anti-corrosive elements than other paints. Thus, it will be seen that there are two systems of protecting the steel surface, one may be called as "Active System" and the other as "Passive System." Active System is like phosphating the steel surface or applying Zinc Chromate, Zinc Dust Primer and the Passive System is the use of Bitumen, Red Oxide Primer etc.

The durability of paint film *i.e.*, the time up to which the paint film can protect the steel surface from rusting mainly depends on the following factors :

- (1) Construction and design of the profile,
- (2) influence of weather on the paint film,
- (3) surface preparation and film thickness,
- (4) method of painting, and
- (5) quality or constituent of the paint.

Though these are the main points to be taken into account, there are also other variables on which the life of the paint depends, which can only be observed on day-to-day working on this line for a long period.

Design and Construction of the profile

The users of paints who are interested to protect their steel constructions against corrosion should avoid a number of edges, corners, screws, nuts and bolts overlapping and position where the rain water cannot overflow and the dust remains stagnant ; because these are the weakest positions where the corrosion may start

by destroying the paint film. As for example, during painting the paint film on the edges of steel profile is always the thinnest, since the surface tension of the film is such that it brings the film away from the edges. As frequent cleaning keeps scale and dirt from accumulating, the design should keep cleaning easy. Corners should be rounded and ample radii should be provided on all pipe bends, corners and vats. Surfaces should be smooth since rough surfaces are prone to gather dirt. Streamlined design can prevent corrosive attack from many angles.

"When a failure does occur, it is necessary to diagnose the trouble correctly. A material with a higher corrosion resistance is always not necessary ; a combination of configuration, material and fabrication techniques may do the job."

Influence of weather on the paint film

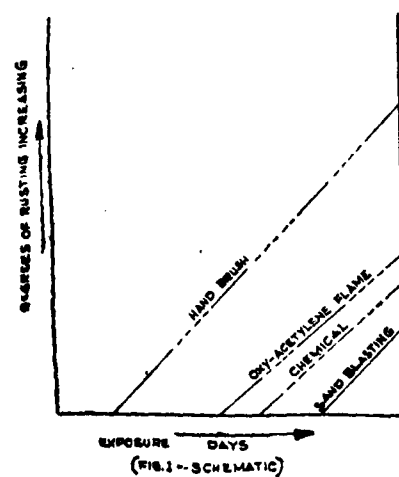
The effect of weather on the life of paint is most important, but difficult to study, since the weather varies from place to place and region to region. The weather affects the paint film by the following ways.

Due to change of atmospheric temperature, the surface tension of the film is affected resulting in cramping of the film surface. When exposed for a longer time, the chemical and physical reactions will change the character of the film. The composition and the nature of atmosphere, the humidity of air, the air temperature, the deposition of foreign material on the surface, the sun rays, the snow and rain will adversely affect the film. All these above agents are very harmful to the paint film, as the colloidal characteristic of the paint on the surface and internal stresses of the film structure will be adversely affected by these agents. In tropical countries the rain and sun rays change suddenly and very frequently. Such a change results in the sudden expansion and contraction of paint film along with the physico-chemical changes, which are most disastrous to the life of paint film. As such, the paint which has been found suitable for cold countries

may not be suitable for tropical countries. Similarly, the paint which has been found suitable for the dry atmosphere may not be suitable for the atmosphere near the sea or in an industrial area.

Surface preparation and film thickness

It has been proved many times that surface preparation of the articles to be painted is most important for resistance against rusting. Figure 1 shows the different ways of surface preparation and their comparative merits and from which it will be noticed that when the surface is prepared by sand blasting or grit blasting, the material is protected best. This

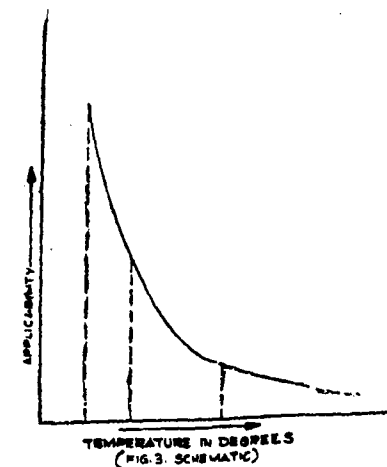
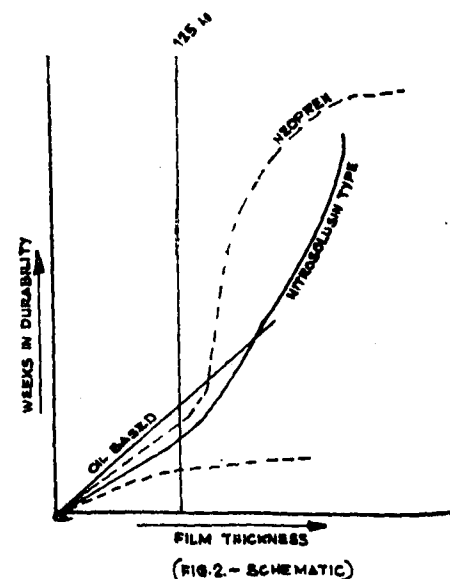


grit blasting not only removes all foreign material but also prepares the surface in such a way that the paint can better grip and stay in position. But care should be taken that painting is done immediately after it is grit blasted. When the surface is prepared by brushing manually, it does not remove all foreign material from the surface of the articles and as such, the resistivity also decreases, which can very well be seen from the figure. There are other types of surface preparations which may be designated as 'Chemical Process'

(Active System) as for example 'Phosphating'. But, it is a well-known fact that sand blasting is the best way of surface preparation for all practical purposes.

As far as the film thickness is concerned it is a common knowledge that the surface is best protected when the thickness is greater and as such, it is a very important factor to be considered. Since the corrosion takes place by diffusion of adverse gases and elements through the paint film, it may easily be stated that greater the amount of pigment, better is the resistance to this type of diffusion and the amount of pigment can be increased by increasing the film thickness. Figure 2 indicates the film thickness and the time up to which the paint film lasts.

From the Figure 2, it will be seen that in general, with the increase of film thickness the resistivity increases. This increment is proportionate with the film thickness of about 125 mew. It is also to be noticed that the performance in the case of oil-based paints is better up to about 125 mew, compared to that of other type of paints, which have come up recently.



The figure also proves that up to about 125 mew of film thickness, the resistivity increases proportionately depending mainly on the film thickness and not much on the quality of the paint. The resistivity in this range is directly proportional to the film thickness. When the film thickness is above 125 mew, different curves behave in different ways which indicate that the resistivity of these paints depends mainly on the quality of the paint and not on the film thickness. It will not be out of place to repeat that the classical oil-based paints give uniform increment of resistivity with increase of film thickness.

To consider the effect of temperature on the paint film during painting, Figure 3 may please be referred to, wherefrom it will be noticed that in general, the brushability decreases with increase of temperature. Moreover, the viscosity of all paints except paint containing silica changes with temperature and as such the film thickness. This indicates that with the change of day's temperature, the rate of production as also the film thickness will vary. This is more important specially in a country where the temperature fluctuates much between morning and evening.

Method of painting

The durability of the paint film depends much on the process of painting and the technique adopted. As mentioned above, the paint film will vary with the temperature. It is advisable to paint the entire portion of a work at a stretch, as the humidity and temperature will vary between morning and evening. As such, it is always advisable to finish the whole surface by employing more painters as soon as possible, depending on the local temperature variations. The main idea is that each and every paint film should be as compact and uniform as possible with uniformity in drying time. It should also be mentioned that if the drying time is too long, then there is every possibility of foreign material being deposited on the surface affecting adversely the quality of the paint. It is also important to be remembered that the paint should be applied vertically and horizontally and the last brushing application should be in the same direction as that of the first. The prescription submitted by the paint manufacturers should be closely studied and followed and if any change is required to suit the shop practice, this may be done only after consulting either the manufacturer or any advisory body available.

It is advisable to apply primer by brush and not spray. This is due to the fact that by brushing all pores and crevices are better filled up due to the pressure and the paints can be built up denser. Before applying primer, the surface should be fully checked up whether it is free from all foreign material and moisture. The second coat can be applied only when the first coat has dried satisfactorily, i.e., when the first coat is not sensitive to touch. This is because when the film dries the paint is polymerised by physico-chemical action and if the first coat is not thoroughly dried up, the blisters may occur, which will be detrimental to the paint film.

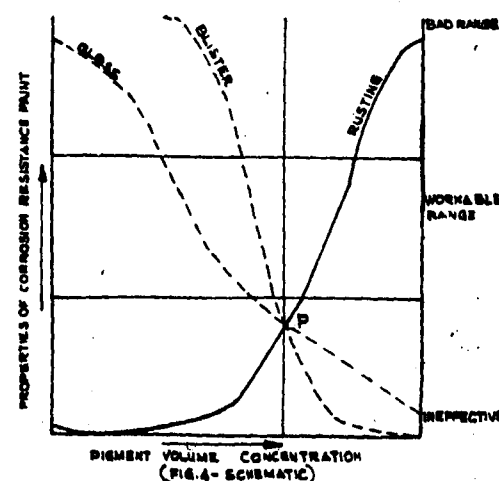
Quality or constituent of paint

After all these, the main thing to protect the steel surface depends on the quality of the

paint which has got two ingredients, the pigment and the vehicle or binder. The protective power of the paint against corrosion depends on the raw material used and right way of mixing and asserting the physico-chemical characteristics of the raw material. It also depends on the manufacturing process of raw materials. It is not very difficult to suggest either the pigment or the vehicles required for a particular purpose as for example, it will not be difficult to pick up a compound, which will not be attacked by acid when a paint is required to give resistance to acid. Thus, the right type of pigment and vehicles can be found out by examining the physical and chemical properties from the fundamental chemical and physical knowledge of the raw materials.

The corrosion resistance property of any paint is dependent on the pigment used because the function of the pigment is to resist the article from atmospheric reactions and sun rays. Thus, a pigment, which reflects sun rays or filters it through and which does not allow the corrosive elements. In the atmosphere to diffuse through, is considered to be the best paint. The filtration of sun rays is more important in tropical countries like India. Again, even if the right type of raw material is used, the size and the appropriate proportion of the binder and the pigment must be ascertained. For the sake of comparison, it may be said that the relation between vehicles and pigment is just like cement and boulder in building construction. As such, the density of pigment in a paint will determine the quality, as the density of stone in cement mortar will determine the strength of concrete. But, as some optimum amount of cement mortar is necessary to strengthen the bonding between stones, so in the case of paint some optimum amount of bonding material is required to strengthen the bond of the paint. Thus, generally speaking, with the increase of density of pigment in a paint will increase the resistivity of paint against corrosion. As pointed out, there exists some interesting relation between

the amount of pigment and vehicles on which the quality of the paint depends. In Figure 4, the pigment volume concentration has been indicated against the properties of the material regarding the resistivity against corrosion. It will be noticed that all these curves have been intersected at a particular point P. The Pigment Volume Concentration may be expressed as a ratio of the quality of pigment volume divided by the sum of pigment volume and the volume of the bonding material. This is



only a characteristic curve expressed schematically.

To explain the curves it will be seen that till the pigment Volume Concentration reaches X, no paint has got any power to resist steel against corrosion (refer Fig. 4). Again when the Pigment Volume Concentration goes much above that value, the resistivity against corrosion is not so useful. With the decrease of Pigment Volume Concentration, the paint becomes oily which increases the glossiness of the paint. Again with the increase of Pigment Volume Concentration above this point P, the full use of this paint cannot be achieved. With the increase of Pigment Volume Concentration above this point, the porosities increase. The most important point is that if the

content is such that Pigment Volume Concentration remains on the right side of the point P, the resistivity of the paint against corrosion is very bad, which advocates the opposite opinion that with the increase of oil-content, the corrosion resistivity increases.

Against a few classical type of paints with raw material like linseed oil etc., after the Second World War, various types of complex paints and painting systems have been evolved. These paints contain various types of complex pigments and bonding material. It is sometimes difficult to ascertain the number of elements present in a paint as also their characteristics, even if it is approached purely from the

theoretical point of view. Moreover, with the change of ingredients in the paint, the characteristics like hiding properties, drying time, film thickness, filtration of light through paint film, temperature conductivity, elasticity of the paint etc., have changed many fold, which means that the painter who is already trained up in one system of painting has to switch over to a different kind of painting process, which again may involve difficulties in the production line.

But, as science is advancing, this has to be faced and the problem has to be solved and the shop practices are to be adjusted accordingly.

CHEMISTS AND METALLURGISTS MEETING

The Indian Railways Chemists and Metallurgists Committee had its eleventh meeting on the 25th, 26th and 27th February 1960 at the factory. The meeting was inaugurated by Chief Administrative Officer, I.C.F. In his address, he emphasised the vital part played by Chemists and Metallurgists on the Indian Railways when the country is developing on the economic front and when there is an all-out drive to substitute imported materials by indigenous ones.

INCENTIVE WAGE PLAN SYSTEM

BY

B. K. KHANNA

A fair day's play for a fair day's work is the slogan of a common man. With the increased tension of wage problem and cry for better living conditions in the recent decade, the need for incentive has acquired paramount importance. After all, what does incentive ultimately aim at and how does this help in solving the cry? Every common man questions to himself when he undertakes a work, "What is my share in the deal?" Naturally, the best way out of a man is to induce in him an impulse which would goad him to earn more with more effort. This would, I hope, adequately define incentive.

The time rate system of wages, was in vogue in the 18th century and is now obsolete. The workman under the time rate system was paid in terms of the number of hours worked by him during the month. The outturn or the quantum of work by the workman, however, had no bearing on his wages.

Although the pay-roll complications are few, the time rate contains no inspirations to labour. Under this system of wages, workmen are paid their daily wages irrespective of the extra effort and higher skill put in by the worker. The most scientific way of paying for extra effort has now been solved by various "Incentive Wage Systems."

Under the various systems, which will be explained later, workmen are paid in proportion to the extra effort put in, as against the standard time fixed after the proper Time-Study, which results in better standard of living, increased production and ultimately maximum utility of Plant, Machinery and Man-power. "Incentive System" is manifold and has undergone several cataclysm in the recent years.

BRITISH BONUS SYSTEM

Straight piecework system

This system is commonly known as the Piece Rate System as the name indicates. The rate per piece is fixed and the worker earns his wages on the number of pieces produced by him in a day. Though it simplifies a lot of costing complications and other clerical routine, it has its own disadvantages in management, and usually leaves room to exploit labour. Further worker cannot be convinced of the validity of the time fixation since it is not based on scientific principles.

Sliding scale wages

This method of payment is known as "Sliding Scale Wages." Under this system, the wages are regulated according to the market price of commodity. Such a system has been operated in the coal, iron and steel industries.

Differential piece rate or Taylor system

Under this system, the rate for below task level is low and as the outturn goes above task level, the rates start increasing. This system was introduced to penalise the slow workers.

Under this system, a subsequent intermediate rate was introduced for 85% of the task. This was only for the beginners and trainees. The beginner naturally has less outturn during starting period as compared to skilled workmen. In this way trainees and new workmen could also earn.

The above were only a start to canalize the capacities of workmen to give more output but they did not hit at the nerve of proper incentive plan. With the break of First World War, the cry for more men was felt so acutely in England and elsewhere, that more thought

had to be given towards this aspect. Pioneers in the shape of Mr. Taylor and later Mr. Gilberth contributed immensely towards the subject and tuned a scientific approach with proper work measurement and method study. This gave rise, later to—

- (1) Halsey System.
- (2) Weir System, and
- (3) Rowen System.

which have also been recognised by the Indian Railways. The primary thing of importance is that proper planning and time and motion study are the basic factors.

A view on time-study

This plays the most important role in the modern age, for a country in the infant stage like ours. Jobs to be manufactured are analysed critically, drawings studied, master schedule laid out for proper planning which consist of raw material scrutiny, process of manufacture, jig design, ultimately work study and time measurement. Time-study as such is a specialised subject and it would be advisable to deal with it separately.

These above mentioned Bonus Systems are based upon amount of time saved against the standard time set-up for manufacture of a job. The savings in time in hours is paid to the workmen as under. The ratio of rates however differ in Halsey, Weir and Rowen Systems.

Halsey System

Under this system, when the output goes above the standard task set, the time saved is paid to workman at 1/3 of his hourly rate.

- H.S. ... Standard Time.
H.A. ... Time taken.
R.H. ... Rate/hour.

Therefore Bonus = $\frac{1}{3} (HS-HA)RH$.

Weir System

In accordance with this system when the output goes above the standard task set, the

time saved is paid to workman at half of his hourly rate.

Therefore Bonus = $\frac{1}{2} (HS-HA)RH$.

Rowen System

Under this system, the bonus earned is the ratio of time saved against the standard time (for example)

$$\text{Bonus} = \frac{(TA-TT) TT}{TA}$$

= whereas time allowed = TA
Time taken = TT

For example,

Time allowed = 25 hrs.

Time taken = 20 hours at	Rs.	nP.
Rs. 1 per hour ...	20	00

Time saved = 20% of the time allowed.

∴ Bonus = 20% of time taken. 4 00

Wages due to worker ...	24	00
Amount saved by employer ...	1	00

AMERICAN SYSTEMS

Gantt Task and Bonus System

The Gantt Task and Bonus Plan guarantees an hourly increased rate when output goes above standard task. This increased rate is 20% higher than normal ratio which is paid below the standard task. For example, the task set is 100 Nos. in 9 hours, which is paid under normal wages. If the output goes above 100 Nos. within the prescribed time i.e., 9 hours, the worker will be paid the increased rate of 20% for his 9 hours work. In this way every workman would attempt to complete his task above the standard task to earn the profit. For example, a man paid Rs. 2 for standard task, will get Rs. 2-37 nP. when the standard task is exceeded.

Emergon Efficiency Plan Guarantees

Emergon Efficiency Plan Guarantees day's wages having set a rather high task level and

paid the workman a bonus based on efficiency ratio. At 66% of the standard level task the workman gets a small bonus which gradually increases upto 20% of day's wages on reaching the standard task level. The system increases the efficiency of the workmen from *sub-standard* to *super-standard* work. This system is more conducive in a place where the working condition is below normal.

Bedaux System

Under this system, amount of useful work performed by an average operator per minute making due allowance for rest and delay, usually turned as 'B' point or a unit, is the amount of work a normal operator can do in one minute, at the normal speed and under ordinary conditions; 60 B's thus constitutes hour's task.

Suppose a job is manufactured in 15 minutes, we shall say that is a 15 'B' unit load. Out of this 12 minutes are actual operative time and 3 minutes are miscellaneous work time allowed to the operator for fatigue etc. Thus any saving made by workman from his miscellaneous time will be counted in minutes will be counted as 'B' saved. These 'Bs' saved by workmen everyday are converted into money and is paid as a bonus.

Conclusion

We find that piece-rate system has been replaced by incentive system which is more scientific and has a more or less direct relation between outturn and wages of the labour.

Piecework and Bonus System both have various different advantages for the employer as well as to the employees. Employer gets more outturn, thus reducing the overhead charges and the factory cost.

Under the British Bonus System, we have seen that the payment is made in for the time

saved by the workmen. The bonus under the Weir System is high if the standard timings are generous. For small savings in time element the Rowen System gives the largest bonus and is most beneficial.

Under the American Bonus System, the task fixed in Gantt Task Bonus and Emergon Bonus Systems is higher. Therefore workman has limit to increase his output upto the task level and above it.

Ideal Incentive Plan

An ideal incentive plan would have—

- (1) Guaranteed minimum wages.
- (2) It should be just to employer and the employee.
- (3) It should be supported by the employer and the employee;
- (4) Timing should change only when method, material or machine changes.
- (5) All standards should be based on Time and Motion Study,
- (6) It should be simple so as the employee can figure his earnings.
- (7) It should not make costing difficult.

Choice of plan

The choice of any of these plans depends upon the type of industry and demand for the product in the market. Mostly the Piece Rate System and the British Bonus System, might be beneficial in Railway Workshops.

In spite of difficulties in these systems in the beginning they are payees afterwards. The effect of these systems is that outturn rises, overhead charges are reduced, factory cost diminishes and the product is cheaper and is of better quality.



BY

N. VENKATASUBRAHMANYAM

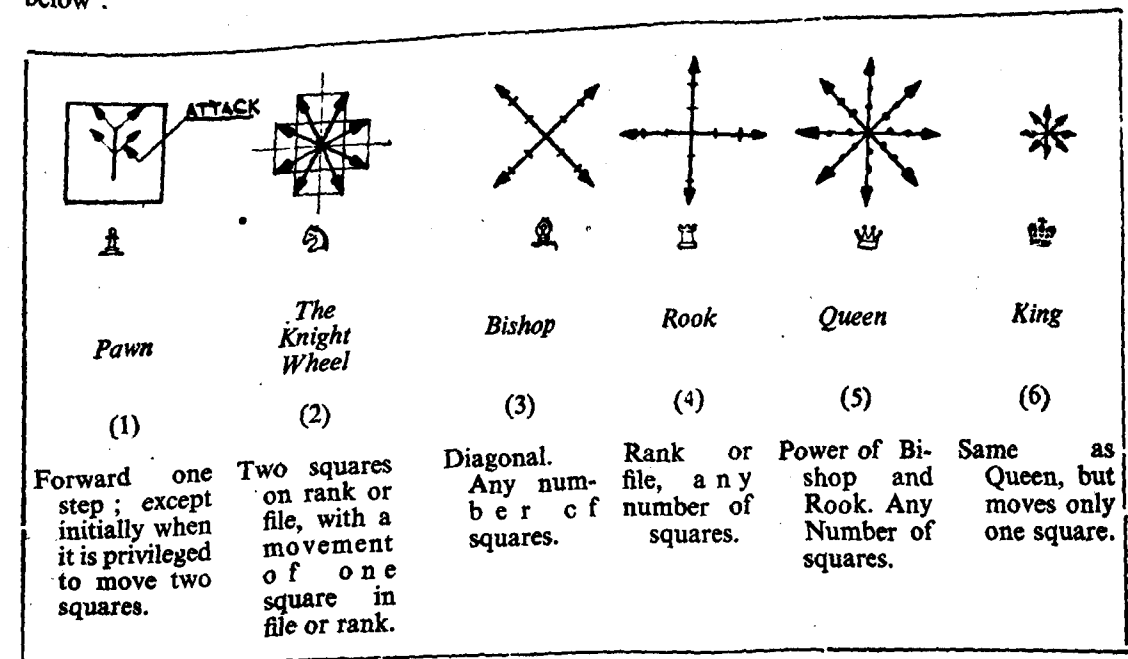
Vice-President, All-India Chess Federation

THE ELEMENTS

Diagrammatic Representation of Moves

The movement of the chessmen was described in the previous article. It will be convenient to remember the figurative description below :

shown as A in the diagram QR6 indicated as A is under attack by the white pawn. The movement of the black Rook pawn "P" beyond A can be restricted, if so desired by white, i.e., ultimately either the black pawn moves two squares if permitted by white or gets slain at (A) and the white pawn moves here. Such a



There are, however, certain peculiar moves described below :

Capture "en-passant." The privilege of a pawn moving initially two moves is conditioned by such a permission being granted by the enemy pawn opposite, if the former pawn traverse the square attacked by the latter. For instance, referring to the position of white pawn P at QN (5th square on Queen's Knight file)

capture by white is described as capture "en-passant", i.e., while the black pawn is on its way: such will be case for movement of the Queen Bishop pawn also. (Fig. on page 31)

Castling. Another important but peculiar move concerns two pieces, the King and the Rook, termed "Castling". Castling consists of moving the King two squares on the rank towards the flank with a simultaneous move-

ment of the Rook to the adjacent square on the opposite side, i.e., the ultimate position after Kingside Castling will be as at 1 (b) below and after the Queenside castling as 2(b) below.



BEFORE KING'S SIDE CASTLING



BEFORE QUEEN'S SIDE CASTLING



AFTER KING'S SIDE CASTLING



AFTER QUEEN'S SIDE CASTLING

This move, however, is conditioned by the following :

- (i) The King and the Rook concerned should not have been moved earlier ;
- (ii) The King should not be under attack, i.e., under " check " as referred to when an attack on a King is involved ;
- (iii) The space in between must be vacant and the terrain moved by the King should not be under attack by the enemy, i.e., in diagram 1 (a) above (first square on the file of King Bishop) and in diagram 2 (a) above Q1 should not be under fire, in case of Kingside and Queenside castling respectively.

It will be observed that during Castling, the King moves to safety while the Rook gets centrally posted for action.

The Elements. The ultimate object of a game is to manoeuvre for the capitulation of the enemy King. As in warfare, a few sporadic raids by isolated pieces near the vicinity of the King will not endure much less ensure victory. May be, it could result in their capture, being generally not properly supported. The need for methodical and rather democratic bringing

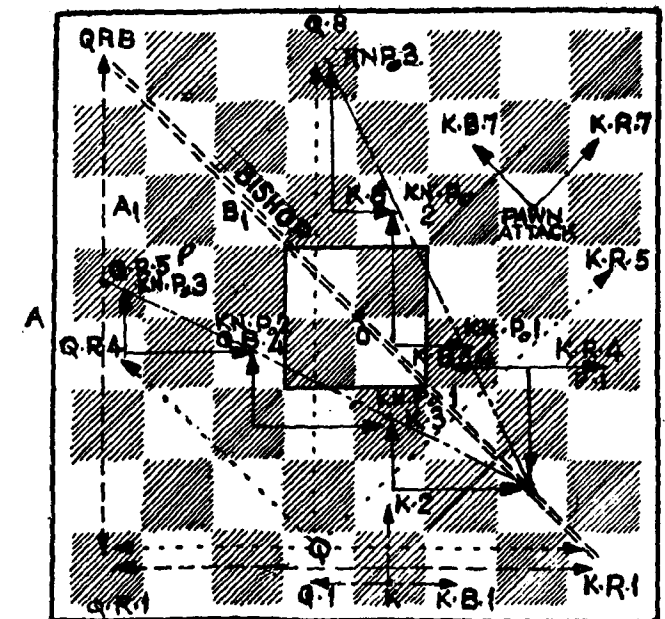
up and developing the pieces for effective action should be obvious, not only for offensive thrusts into enemy territory but also against penetration by enemy into one's own lines. At the outset, it is necessary to possess the

knowledge of what constitute the various elements which enable one to build up advantages and work upon them with a sense of quiet confidence, which favour the full use of imagination. Knowledge of strategy and tactics will follow with due practice. The elements are broadly speaking : (i) space, (ii) time, and (iii) force. In actual game these are in a continuous state of flux and a proper appreciation of each element is necessary for correct evaluation of the respective overall positions.

- (i) **Space :** The Centre. The squares at the centre are most important. They are the four squares the fourth and fifth squares on the files of the King and Queen *vide* diagram above. While these squares are at calling distance for defence, they are also within striking distance for offence. Further they serve as the base or jumping ground for a larger number of squares than otherwise. The sixteen squares about the centre can also be described as Central Squares. It will be obvious a power at the centre should have more strength at the centre than when positioned outside.

This diagram which appeared in January 1960 issue of Railcoach is again published here for the reader's benefit.

—Ed.



- (ii) **Rank and File :** The movement of any power in the rank is more or less neutral. The forward movement in the file is aggressive.
- (iii) **Diagonal :** The strongest diagonal is the longest ones across the chess board through the central squares. It represents a distance of eight squares ; the weakest is shortest of two squares at the four edges of the chess board.

The unit of space is the square itself as against the mere geometric distance " measured on the board ". Here-from follows the great peculiarity of the chess board. A look at the triangle formed by two adjacent edges and a diagonal will show it is isoscelous. But measuring the space by our unit of " square ", it will be apparent all the sides contain eight squares, i.e., the triangle is equilateral. Without a clear knowledge of this aspect, quite a lot of misconceptions arise, especially in the end game, because the King can sedately walk across the diagonal a distance of 1.4 times the side during

the same time the Pawn technically takes to go through the squares one by one in the side.

Time. The opponent's King has to be reached in a lesser number of moves than the opponent would take to reach ours. Hence the " move " represents the unit of time. Chess moves are made one alternatively by the parties. A move made of one's own accord gains time, while a move forced by the opponent loses time. Even in a free move, it can be active setting the opponent thinking about defence or be merely passive : in the former case, there is an obvious saving of time. Time in other words is represented by the number of effective moves. From a negative angle, forcing the opponent to waste moves by making him retract from the forward positions also gains time.

In the end game, with a Pawn on the board the effect of time is all important, since the pawn by moving on to the eighth rank can well become the Queen herself.

Force. Force is represented by the rate of

movement over space, i.e., squares within a limited time or moves. In other words, it represents the speed. How far can a piece travel normally in a move is known. But in the chess board cluttered up with opponent powers and pawns (and our own also coming in the way!) assessment of the force of each piece positioned in the chess board as against the innate force, becomes difficult. A lot depends on the command of territory and freedom of action. It is in this capacity to discern and discover the net force of all the pieces and execute moves to ever increasing strength, the science of Chess becomes really an Art.

The subject of force or power of the various chessmen intrinsic as well as positional is discussed in a very general manner below :

- (i) *The Pawn* : He is conspicuous by his lack of speed ; but though slow, if he is steady, he can well reach the eighth rank and can be converted into any power including the most powerful Queen. Its strength lies in the fact that it can render more effective support to the powers. A supported pawn can be a great harassment to opponent who has merely to retreat (in such cases.)

A passed pawn is one where there is no more enemy pawn which can block its movement on the file or has command over any of these squares. It may be there are no pawns in the adjoining files or they may have gone past in rank to the pawn. Pawn P-1 in the diagram is a passed pawn. The passed pawn has the "potential" to move forward to the eighth rank unhampered by enemy pawn and hence its strength.

A pawn chain is formed when one pawn supports another pawn along the diagonal. It acts as an effective barrier against enemy penetration.

- (ii) *Knight* : It is not so mobile as the Bishop but its strength lies in its use while the terrain is restricted for other powers. It lands on different coloured squares. A King with two connected Knights can effectively draw against even a Queen and King.

- (iii) *Bishop* : It has greater speed and mobility than the Knight. But in restricted position when it gets blocked by its own pawn or pieces, its scope gets restricted.

Two bishops acting in unison is a great force. Two bishops on adjoining diagonals shut out a considerable and contiguous space for the enemy movements.

- (iv) *Rook* : This is stronger than the Bishop. As against the Bishop it can shut out a complete file simultaneously. A game can be won by a mated King aided by a single Rook but not by a single Bishop.

The Rook upto the middle game does not come into full force. It can get harassed by lesser powers. Even so a Rook at the base of an open field or a Rook posted in the seventh rank is a force beyond recognition.

- (v) *Queen* : This is the strongest power on the board. Early movement into the the open may result in harassment by minor forces.

Generally speaking the bishop or knight can be individually equated to a little over 2 pawns; and a Rook may be equated to 3 pawns. A Bishop or Knight plus one pawn can be said to be equal to a Rook. Of course, these assessments are only to serve as general guidance since the actual power will depend on the position.

- (vi) *King* : Though the King is about the weakest power (other than pawns) on the board because of its lack of speed, it is a great force

in the end game. It is really a small Queen to be contended with.

Though in the early stages of the game the King has to be relegated to the rear merely to be kept guard over, towards the end game it has to step out and take up the role of an active participant.

Check : When an attack on a King is declared, it is called a "Check". When the King under check has no square to move or can only move into adjacent squares all controlled by the enemy forces it is a "mate".

Stalemate. When, however, the King is not under check but the player has nothing else to move than the King to a square under attack by the enemy, there follows a "stalemate" which is but a draw. Surely the surrender of a King should not be accidental, but forced ! As a matter of fact, when in a superior position the end game is on, the thought of avoiding the opponent getting into a stalemate should be very much alive : similarly, in an inferior position, it is worthwhile to strive for creating such a position.

(To be continued)

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RAILCOACH
R 3

DID YOU KNOW . . .



The voluminous clothing worn by the women of Bhutan, a tiny nation tucked between India and Communist-dominated Tibet, serves as blankets at night.

—By SCIO

SPORTS *activities*

In I.C.F

By A. R. VENKATACHALAM

I.C.F. has made a distinction not only in the sphere of production, but also in the world of sports.

I.C.F. went into production in the year 1955 and within a short span of time it has forged ahead in rapid strides beating revised targets. It is admired by one and all as a 'Magnificent Factory' not only from the technical progress point of view but also from the employer-employee relation, which is no doubt excellent. In the field of sports too they have created good records, in almost all games either conducted in Madras or outside.

The I.C.F. Football Team has proved its mettle. It has been slowly but steadily built

up and the team has won many laurels during the past years. They were joint-holders with Southern Railway in the Inter-Railway Football Tournament in the year 1957. Some of the players like Janakiraman (skipper of I.C.F. team), Stephen, Sreenivasulu, Siva, Kanniappan, Rajaram, Williams and Kuppuswamy had the unique honour of representing the State in the Nationals. The team had a set-back due to a few top-notch players (like Devadoss who represented India in the Asian Football Tournament and Thomas—a good Centre Forward) leaving this administration. But, however, the team has made up the loss by the inclusion of new players like Ramamurthy former State and Rajasthan player, Pearl,



Our Hockey Team which won at Palayamcottah, the Paul Thangiah Edwards Memorial Trophy.

former Services Player and Rajamani former M.R.C. player, who have all already proved their worth in the team, by winning the Gymkhana Club trophy earlier this season. The I.C.F. Football Team starting from the fourth division league, by their good performance have the distinction of earning promotion every year by winning the Championship in each division and now they are appearing for the first time in the First Division League.

The I.C.F. Hockey Team is also making a headway. They were the league champions last year and it is hoped that they will retain the same this year too. They won the Paul Thangiah Edwards Memorial Hockey tournament at Palayamcottah for the second year in succession. It will not be out of place to mention here that Jabbar, Thulasingham, Muruges, Michael Nair were selected for the Railways and Syed Ahmed for the Madras State for the Nationals held at Calcutta during February 1960 for the Rangaswami Cup. It is a matter of pride to mention here that the first three players of the above are selected for the zonal camps for coaching prior to the selection of India's Hockey Team for the Rome Olympics.

The I.C.F. Cricket Team too is getting stronger and stronger and news is just now to hand that they have annexed the League Championship in the First Division 'B' Zone this year and have thus brought home the "C. P. Johnstone Trophy."

The I.C.F. Volleyball Team is gradually coming into fine shape. It participated for the first time in the Inter-Railway Volley Ball Tournament held last year. It was creditable on their part to have won the first round by

beating Chittaranjan, but however they were defeated by the Northern Railway in the next round.

To B. S. Mani our ace cyclist goes the credit of having won many laurels in the tournaments held in and outside Madras.

The I.C.F. Athletic Team, although few in number, are performing remarkably well. Shri C. Sankaran and Miss Ceiline O'Connell are in top form in running broad jump and discus throw respectively. It is a matter of gratification that they have been included in the Madras Team for the Triangular Meet at Ceylon and for the Nationals taking place at Delhi.

The I.C.F. Badminton Team is now a good combination consisting of stalwarts like Kareem, Yuvarangam and Pantulu and they have fared very well in many tournaments.

The I.C.F. Chess Team has just made a start and it is hoped that in due course this team too would come up to a very good standard.

A stadium is a long felt need in I.C.F. and it is good news that the work on the stadium is to be taken up shortly. Then our Administration will be in a better position to offer greater facilities to one and all, who are interested in sports.

The I.C.F. Sports Council consisting of members in charge for different games is giving encouragement in every field towards every game and of course to all the players as well. To bring out talents, Inter-departmental tournaments in various games are held every year. Thus goes up the name and fame of I.C.F. in the arena of sports activities.

ARRESTS AND CONVICTIONS THROUGH DOGS

Instructions have been issued to all zonal railways to organise dog squads which would be utilised for the prevention and detection of thefts of railway property.

Within a short period of ten months, dogs on the Southern Railway were used in the investigation of ten cases of theft in which property worth Rs. 4,500 was involved. The dogs had to their credit useful work by way of arrests and convictions.

WELFARE NEWS

Staff Council

Consequent on the expiry of the two-year tenure of the first Staff Council, a second Staff Council has been formed with effect from 20th January, 1960. The inaugural meeting convened on the 26th January 1960 was addressed by CAOR who congratulated the members on their successful election and appealed to them to extend their utmost co-operation and assistance to the administration in maintaining the sound and healthy traditions built up by the I.C.F. Family.

I.C.F. Family Welfare Fund

The I.C.F. Family Welfare Fund is managed by a committee consisting of the undermentioned personnel :

Shri A. V. Subramaniam, P.O. President.

„ T. S. Jayaraman, DCOS/
Depot ... Chairman

„ M. Jayavelu, SLWI
General ... Secretary

„ T. Ramdas, OS/CAOR'S
Office ... Member-cum
Treasurer

„ K. K. B. Panikkar, DSK. Member

„ K. Ramachandran, FO/
Shops, 10, 11 and 20. Member.

This committee, at the first meeting held on 28-1-60 have drawn up detailed rules and procedures in conformity with the objects of

the fund. These rules would take effect from 1st March 1960. The main object of this fund is to render voluntary social service to the employees. As the fund will be built up of voluntary contributions by the non-gazetted and gazetted staff of this administration, the co-operation of the members of the I.C.F. family is solicited in making this scheme a success.

Staff Benefit Fund

The first business meeting of the Staff Benefit Fund Committee was convened on the 15th February 1960. Applications received from staff for grants from SBF were given careful and sympathetic consideration by the committee. Particulars of the grants sanctioned by the committee to 145 employees are furnished below, for the purpose indicated against each:

Purpose	Amount	
	Rs.	nP.
Relief for T B patients ...	2,841	00
Medical assistance ...	1,467	29
Relief of distress ...	100	00
Education of staff and their children ...	2,185	91

Confirmations of staff

126 confirmations have been made during February 1960, bringing the total number of confirmed employees in the Factory to 3358.

TELEPHONES AT 850 RAILWAY STATIONS

Orders have been issued in August 1957 for the installation of telephones at all railway stations located close to the towns served by the P. & T. telephone exchanges except at some suburban stations not dealing with goods and parcel traffic.

Prior to the issue of these orders telephones existed at about 470 stations. Since then, telephones have been installed at about 380 stations and orders have been placed on the P. & T. Department for the provision of telephones at 230 more stations.

Our Hearty Felicitations to . . .



. . . Shri T. S. Srinivasan, Mistry, Gr. I of shop 40 and Sow. Rajalakshmi Ammal, sister of Shri C. D. Sundararajan, Sub head, Personnel Branch who were married on the 10th February 1960 at Madras.



. . . Shri J. Venkata-ramani, welder, shop 13 and Sow. Leela, who were married on the 22nd January 1960 at Tirupathi.



Shrimati K. G. Hiranandani distributed prizes to Winners of various sports events held in connection with the Republic Day Celebrations in the I.C.F. on the 26th January 1960.

The XI meeting of Indian Railways Chemists and Metalurgists Committee was held in I. C. F. during last week of February 1960. Photo shows the Committee in session.



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COVER :

Good going by Asir Jagadisan seen here
ahead of all in a running event during Fifth
I.C.F. Athletic Meet.

Do You Know

DURING 1958-59, 191.15 miles of new rail lines, including 17.4 miles of a non-Government Railway, were opened to traffic.

THREE hundred seventy-one new locomotives, 1,740 coaching vehicles and 16,701 (broad and metre gauge) wagons were placed on line during the year 1958-59.

ABOUT 20 new trains were introduced and the runs of 13 trains were extended each month during the first nine months of the current financial year 1959-60.

TOTAL payments made for purchases of stores during 1958-59 amount to Rs. 254.08 crores, of which Rs. 167.93 crores were for indigenous materials and Rs. 86.15 crores for imported materials.

THE number of railway employees on March 31, 1959, was 1,149,622 as compared with 1,118,848 on the same date last year.

DURING 1958-59, 11,481 staff quarters were constructed for railway-men.

THE route mileage of all the railways in India on March 31, 1959, was 35,080.65, of which 16,391.74 miles were of broad gauge, 15,508.36 of metre gauge and 3,180.55 of narrow gauge.

THE number of passengers originating on all the railways during 1958-59 was 1,440.92 million and the earnings from carriage of passengers was Rs. 117.57 crores.

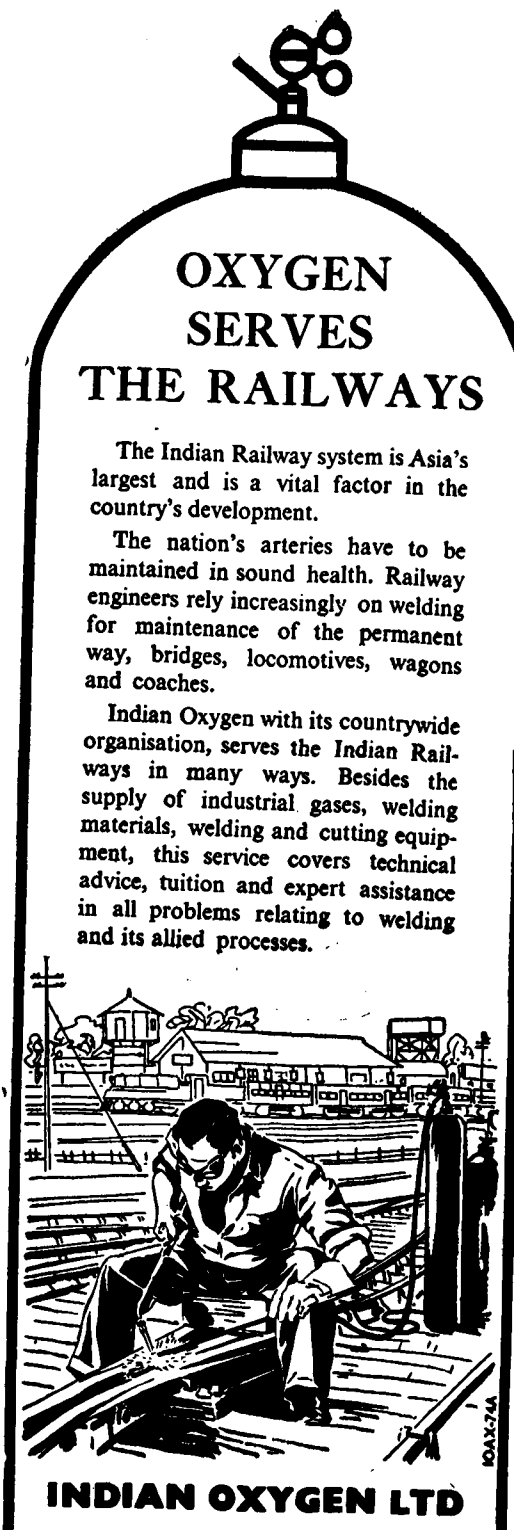
THE freight tons originating during 1958-59 on all the railways in India were 136.10 million and the earnings from carriage of goods were Rs. 237.04 crores.

THE capital-at-charge of all the railways in India on March 31, 1959, stood at Rs. 1,362.89 crores as compared to Rs. 1,228.67 crores on March 31, 1958.

editorial

Will the I.C.F. which is reigning supreme in the field of production of coaches, reign supreme in the arena of sports too? This question has been in the minds of not only our sports enthusiasts but also men in the Sports Council. The I.C.F. teams specially Hockey, Football and Cricket with their spectacular wins recently, have every ingredient to make them run victorious in future events. The I.C.F. Sports Council has gone about in a business like manner to select the best players to represent the I.C.F. in every game and the I.C.F. Sports Council deserves full marks for a difficult job very well being done. To build up a first class fighting-fit side for every game it is hoped the I.C.F. Sports Council will conduct many more training camps to train and test potential players.

Elsewhere in this issue two reports appear on the Fifth I.C.F. Athletic meet and the I.C.F. Cricket teams victory in the First Zone 'B' Division. Though the Cricket news is heartening the results of the Athletic Meet leaves much to be desired. Regular training and practice alone can bring our athletes to the forefront they desire to be in. A few days' practice before the meet will do nobody any good. There are quite a number of potential young athletes and let us hope that with intensive practice and necessary encouragement they will create new National records in the next Meet.



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- (i) Minimum Size—Cabinet
- (ii) Print to be on glossy paper
- (iii) Captions to be pasted on the reverse

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NOTE**

I. C. F. ATHLETIC MEET 1960 GOOD SHOW BY YOUNG ATHLETES

Asir Jagdisan New Champion

The eagerly awaited Fifth Annual I.C.F. Athletic Meet was gone through in a most colourful manner on the 11th and 12th March. Conducted in the style of Olympic Games the Meet had a touch of grandness throughout. Flags of the different teams spluttering gaily against the lovely blue background of the sky, gave the place—the I.C.F. grounds next to the T. T. School, where the meet was held for the first time—a look of delightful colour. On the 11th March, on arrival of the Chief Administrative Officer, Shri D. R. R. Sastri, Sports Secretary, I.C.F. received him and introduced him to the officials of the Meet. The 13 competing teams wearing colourful uniforms and holding aloft their flags marched past as the President took the salute. When the President declared the Meet open, trumpets were sounded, 13 pigeons released and 13 guns fired—representing the number of teams participating.

C. Sankaran, (who had the unique honour of leading the Madras Athletic Team that participated in the Nationals held recently at Delhi), on behalf of the I.C.F. Athletes took the oath,

"We swear that we will take part in the Fifth I.C.F. Athletic Meet in loyal competition respecting the regulations governing them with the desire to participate in the true spirit of sportsmanship for the honour of our administration and the glory of sports."

On both the days there was a large gathering to witness the Meet. The Meet was throughout interesting and it goes to the credit of the organisers the efficient way in which the Meet was conducted.

Of the athletes, Asir Jagdishan was undoubtedly the best as can be seen from the fact, the number of prizes he won including the Individual Championship.

First Day

On the first day 6 finals were gone through. P. B. Dawson of 'F' Shed came off with flying colours in Discus Throw event by hurling the discus to a distance of 95 ft. Ramakrishnan Nair of 'B' Shed came second.

C. Sankaran did not have any difficulty in coming first in the Running Broad Jump by clearing 22' 1½". Of course, this is much lower than his own record of 23' 4½" in the Inter-Railway Athletic Championship in the year 1959. Asir Jagadisan of 'A' Shed came second.



Shri Shankaran taking the oath

Ramakrishnan Nair of 'B' Shed came first in Javelin Throw, the distance being 126 ft.—beating his own record of last year by 6 ft. Deivasigamani of 'E' Shed came second.

Theodore Samuel enabled the Technical Training School to open their account by coming first in the Shot Put event covering a distance of 30' 11". P. B. Dawson of 'F' Shed came second.

In 3000 metres, V. Erulan of 'E' Shed came first, the time being 9 minutes 50.5 seconds. Gangatharan of 'B' Shed came second.

V. Erulan added another feather to his cap by coming first in 5000 metres. He had no difficulty at all in coming first, since his main opponent Ranganathan was not in his usual form. It was a keen contest for the second place between Ranganathan of 'C' Shed and Gangatharan of 'B' Shed, in which the latter won by a brilliant dash in the last 50 metres.

Second Day

On the second day 12th March, 1960, the finals for the rest of the events were gone through.

In 100 metres, V. Rajamanickam of 'F' Shed and Asir Jagadisan came first and second respectively.

In 200 metres again the honours went to V. Rajamanickam and Asir Jagadisan as first and second respectively.

In 110 metres Hurdles, Ramakrishnan of 'A' shop came first and the second place was snatched away by Asir Jagadisan.

In 400 metres Hurdles, performance of D. Pearl (of E Shed) was praiseworthy. He came first by creating a new I.C.F. record of 1 minute 53 seconds and A. Satur of Stores came second.

In 400 metres, V. Rajamanickam, who clipped off 1.2 seconds off last year's I.C.F. record, came first by timing 53.6 seconds was quite impressive. A. Satur of Stores came second.

In 800 metres, A. Satur came first and G. Purushothaman of R.P.F. came second.

In 10,000 metres V. Erulan of 'E' Shed ran his way to victory. He is indeed an impressive runner. G. Lopez of the same Shop came second.

In 1,500 metres, Gangatharan of 'B' Shed came first and Ranganathan of 'C' Shed came second. It is noteworthy to mention here that Erulan came third in this event in spite of running 10,000 metres only a few minutes earlier.



A. Satur

In 4 x 100 and 4 x 400 metres Relays, 'A' Shed took the first place in both the events and the second place was taken by 'F' Shop in the for merevent and by R.P.F. in the latter.

In the Hammer Throw event Ramakrishnan Nair of 'B' Shed came first by hurling the hammer to a distance of 61' 9" and P. B. Dawson of 'F' Shed came second.



Discus throw event in progress



Asir Jagdisan—the new champion receiving the prize

In Hop, Step & Jump Asir Jagadesan of 'A' Shed established his supremacy over his colleague Ramakrishnan.

In the Running High Jump, Sam Pushparaj enabled Civil Engineering Department to open their account by winning the first place and Asir Jagadisan came second.

In Pole Vault, again Asir Jagadisan established his supremacy by clearing 9' 11½" bettering last year's I.C.F. mark and B. Venugopal of 'E' Shed came second. There was a keen and prolonged fight for the place of honour.

In 10,000 metres Fast Cycle Race (open to all staff) D. S. Mani came first—as expected, and Angamuthu of 'B' Shed came second.

There was a poor response from the Lady employees for the events open to them. Miss Ceiline O'Commel had an easy time in coming first in all events and eventually in winning the Individual Championship (women).

In the visitors event Miss Shakuntala Keshaviah came first.

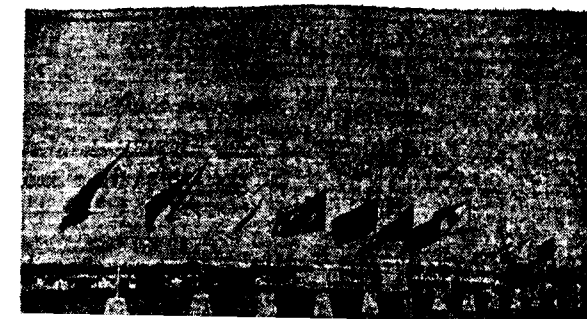
In 800 metres open to all, Dorairajan of Sport and Pastime School came first and R. Peterson came second.

After all the events were over, the Athletes marched into position, with the Southern Railway Band playing. Mr. Scott, Member/Athletics requested the Chief Administrative Officer to distribute the prizes. Thanks to Asir Jagadisan, the pivot of 'A' Shop, who won the individual championship by lapping 27 points to his credit, 'A' Shop annexed the 'K Swarup Challenge Trophy' this year by scoring 56 points. The Technical Training School were adjudged as the best in Turn-out and were awarded the rolling cup.

C.A.O. (R) while declaring the meet closed congratulated all the officials and employees on the conduct of this colourful meet. As C.A.O. (R) declared the meet closed, bugles were scunded and flags of the participating teams were lowered. Six guns were then fired to mark the close of this meet and to herald the coming sixth meet. Four outstanding Athletes brought the I.C.F. flag to the dais to the accompaniment of stirring music and handed it over to C.A.O. (R.) who in turn gave that to the Member/Athletics for safe custody. The function came to a close with the playing of the National Anthem.

—A. R. VENKAT

.... At the Stadium



MARCH, 1960

News and Views

First India-Made Electric Locomotive Next Year

The Deputy Railway Minister, Shri Shah Nawaz Khan, informed the Lok Sabha on March 2, that arrangements to start manufacture of electric locomotives at Chittaranjan were in hand and the first 1,500V.D.C. electric locomotive was expected to be manufactured by about the middle of 1961.

Rail Concession to T.B. Patients now available in all States

The Railway Board has decided that the travel concession at present admissible to tuberculosis patients for travel to and from T.B. hospitals, sanatoria, institutes and clinics within the State in which they reside, should with immediate effect be made available, to and from such institutions situated in other States also.

While travelling to or from a T.B. hospital, sanatorium, institute or clinic, the T.B. patient is allowed to travel at one-fourth of the normal fare when travelling alone, and on payment of one single fare when travelling with an attendant (for both persons).

The concession is allowed on production of a certificate from a registered medical practitioner or the officer-in-charge of the institution concerned.

Chittaranjan Locomotives

The Deputy Minister of Railways, Shri S. V. Ramaswamy, told the Lok Sabha on February 26, that the average foreign exchange element in the manufacture of a locomotive in the Chittaranjan Locomotive Works was Rs. 1,39,000 in 1956 and Rs. 70,000 in 1959.

The average man-hours required per locomotive during 1956-57 were 26,800 and during 1959-60 (upto October 1959), 29,200.

Replying to another part of the question, Shri Ramaswamy said that the present average cost per locomotive was Rs. 4,09,000 excluding dividend and Rs. 4,57,000 including dividend.

Railway Passenger Fares Tax Distance Zones in Kilometres.

The tax at present levied on railway passenger fares will, with effect from April 1 this year, be based on distance zones expressed in kilometres, instead of in miles.

This follows the Government's decision that the commercial departments of the Indian railways should switch over to the metric system of weights and measures with effect from April 1 this year.

At present, a tax of 5, 15 and 10 per cent is levied on distance zones 16 to 30, 31 to 500 and over 500 miles respectively. After the change-over, there will be a tax of 5 per cent on journeys from 26 to 49 kilometres, 15 per cent on journeys from 50 to 805 kilometres and 10 per cent on journeys over 805 kilometres. No tax is levied on journeys upto 25 kilometres.

Passengers travelling on mileage coupons will, as at present, pay a tax of 12½ per cent of the cost of coupons.

There is no tax on passengers travelling on season tickets in suburban trains.

MANUFACTURE OF COACHES BY RAILWAYS

No Imports during 1959

There was no import of coaching stock during the period from April, 1959 to the end of December 1959, said the Deputy Minister for Railways, Shri Shah Nawaz Khan, in the Lok Sabha on the February 26.

The Deputy Minister also laid a statement on the table of the Sabha indicating the number

of first, second and third class coaches manufactured in various factories during the period from April to the end of December 1959.

According to the Statement, 889 III class coaches, including III class sleeper coaches were manufactured during this period. Of these, 578 were broad gauge coaches, 273 metre gauge and 38 narrow gauge coaches. The Integral Coach Factory manufactured 316 broad gauge coaches, the Hindustan Aircraft Ltd., Bangalore, 156 BG coaches and Messrs. Jessop & Co., Calcutta produced 193 M.G. III class coaches. The various railway workshops manufactured 106 broad gauge, 80 metre gauge and 38 narrow gauge coaches.

The statement says that the railway workshops also manufactured 5 I class metre gauge coaches but no II class coaches were manufactured during this period.

The statement also indicates how these coaches were allotted to the various zonal railways.

A.I.R. Programmes in Trains

Replying to a question, Shri Ramaswamy, Deputy Minister for Railways said in Parliament on the February 11, that on an experimental basis it had been decided to relay

All-India Radio's news bulletins and to play tape-recorded orchestral and instrumental music in the coaches of one of the rakes of the air-conditioned express trains, running between Howrah-New Delhi-Madras.

He said that the cost of the new amenity, exclusive of the public address system which already existed was about Rs. 1,00,000.

"Indian Railways—1958-9" Popular Handbook Published

A popular handbook, entitled "Indian Railways—1958-9" has just been published by the Ministry of Railways, presenting in readable style the different aspects of the working of the Indian railways during the financial year, 1958-9.

The publication, which is available from the Manager of Government Publications, Delhi, presents in simple, non-technical language a brief account of the operations of India's largest nationalised undertaking. Besides comparative figures relating to the year's performance given side by side with those of a few preceding years, there are a number of useful appendices. There are 28 charts, 22 statistical tables giving statistics for 1938-9 and from 1950-51 onwards and a small scale railway map of India.

The man who wants to know who is boss in the house is usually much happier if he does not try to find out.

"Were it not for imagination, Sir, a man would be as happy in the arms of a chambermaid as of a Dutchess." Dr. Johnson.

RECENT DEVELOPMENTS IN WELDING ELECTRODES AND NEW TESTING PROCEDURES

Part I

BY

DR. ING. K. L. ZEYEN

(This article was first published in German in 1956 in "Das Industrieblatt", issues 6 and 7, and was reproduced in "Schweissmitteilungen," issue 25 (1956). The present English translation has been made by M/s. J. B. Advani oarlikon's chief welding technician, Mr. S. V. Nadkarni).

A. Introduction

In an article published in December, 1955, K. Kloppel (1) shows how the far-reaching extensions in welding technique have proved to be an inspiring and magnetic force for metallurgy and steel mills on the one hand and for the steel fabricator on the other, and gives examples of interconnecting and widely ramified effects of problems posed by welding technique. The present day standard of quality and output obtained in the field of this modern technique of welding could only be reached through the collaboration of engineers, fabricators and specialised research organisations, in which each one has made his own definite contribution.

On the subject of new developments and the present day position in the field of electric welding the author published his paper in the year 1955 (2). No supplement has been made to this paper till this day.

Of the various welding processes which are at our disposal today, the manual or automatic electric arc welding can be considered as the most important and the most extensively used, without underestimating the importance of the other processes. This is also evident from the

series of papers on the subject in the recent literature. In 1955, the author dealt particularly with the new knowledge gained in the field of development of electrodes for manual arc welding and with the work of surveying the important role which they have played in furthering this process (3). This work dealt with a series of latest developments which appeared to have a decisive influence on the quality and economy of manual arc welding, especially concerning new developments in the field of low-hydrogen electrodes, iron powder electrodes and deep penetration electrodes. Since these electrodes, which have been playing their part in the current advancement, have, in the meantime, made further progress in respect of their own pure development and of the further knowledge accumulated around them, some mention should be made of them in the following paragraphs.

B. Deep Penetration Electrodes

Shortly after the publication of the author's article just mentioned (3), appeared an important new paper from H. Neumann (4). In this it was established after extensive trials that besides welding generators, transformers and rectifiers are also suited for deep penetration electrodes, whereby one can suppose that the conditions demanded for this technique of welding can be met as much by these welding power sources as by the electrodes. Neumann shows from his experimental data that today we have at our disposal welding power sources and electrodes for deep penetration technique which guarantee not only radiographic welds free

from porosity but also joints in which the weld has penetrated deep into the parent metal. He further once again makes an analysis of saving in cost and welding time obtained in this case compared with the procedure using standard electrodes with very high currents. Figures 1 and 2 give a graphical presentation of the results while figures 3 and 4 show the polished specimens of full penetration double fillets made in horizontal vertical position on

thicknesses of 17 mm. and 5 mm. respectively. Of the many examples of practical application of deep penetration welding described by Neumann, is cited in Fig. 5 the tube wall of the smoking chamber of a ship boiler whose repair by welding would have been absolutely impossible or in any case extremely difficult without the deep penetration electrodes. In all the instances shown in figures 1 to 5, alternating current has been used for welding.

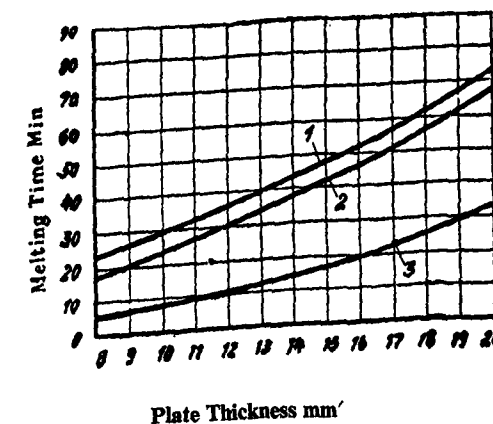


Fig. 1. Pure welding time for 1 m. weld joint (After H. Neumann).

- 1 = V-Joint with normal sealing mm.
- 2 = V-Joint with Sealing run with deep penetration electrode.
- 3 = I-resp. J-Joint with deep penetrations electrode.

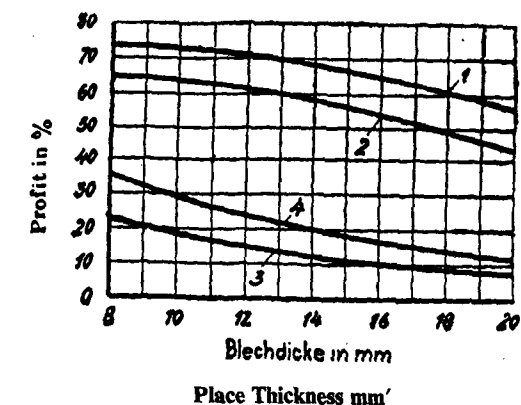


Fig. 2. Profit in welding time and total costs (after H. Neumann).

- 1 = welding time and costs in I-Joint against V-Joint.
- 2 = costs in I-Joint against V-Joint.
- 3 = welding time and costs in V-joint with Sealing run with deep penetration electrodes against V-joint with conventional electrodes.
- 4 = costs in V-joint with Sealing run with deep penetration electrodes against V-joint with conventional electrodes.



Thickness of vertical plate 17 ... 5 mm.
Root Gap 3 ... 0 mm.

Figs. 3 and 4. Deep penetration double fillet welds made on A.C. Supply. (after H. Neumann).

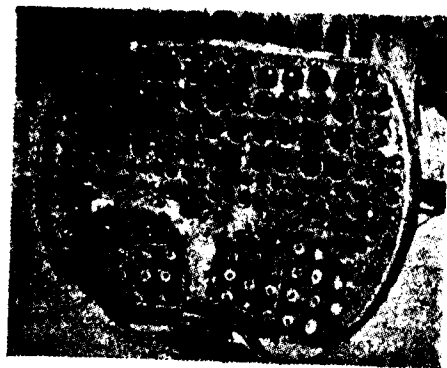


Fig. 5. Tube end of a firebox of ship boiler (after H. Neumann). Guaranteed weld joint at the rear wall and sealing run for the weld at the tube end: deep penetration electrodes.

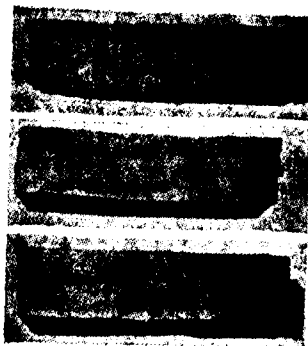


Fig. 7. Etched sections through holes filled up by welding with low hydrogen electrodes. (Plate thickness 30 mm.)

- (a) Hole dia. 12 mm. (1 electrode of 10Swg.)
- (b) Hole dia. 20 mm. (1 electrode of 6 Swg.)
- (c) Hole dia. 40 mm. (4 electrodes of 6 Swg.)

Fig. 6. Cutting of Groves various depths and holes of various dia. in 25 mm. thick plate with deep penetration electrodes.

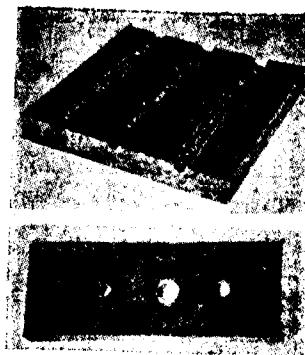


Fig. 8. Spot welds with deep penetration electrodes. Thickness of upper plates 1, 3 and 5 mm.

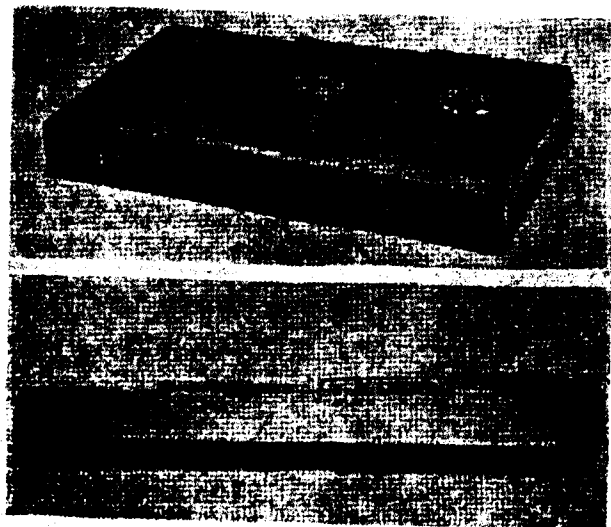
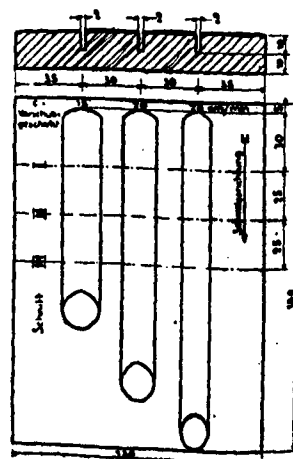


Fig. 9. Test for obtaining data on deep penetrations, characteristics of deep penetration electrodes.



Another field of application of deep penetration electrodes has been recently found. For joining plates and profiles plug welds have been used occasionally. As the author explained recently (3), these holes are generally made by drilling or punching. It was stated that deep penetration electrodes, besides being suitable for making weld joints, can also be used, when applied correctly, for cutting grooves

of various depths and holes of various sizes (Fig. 6). The author further pointed out however, that although one often wants to execute plug welds with standard electrodes, this is only too difficult and becomes hardly reliable as soon as one has to deal with heavier sections. The nature and quantity of slag formed in case of these electrodes makes it impossible to fill up the plug in one operation.

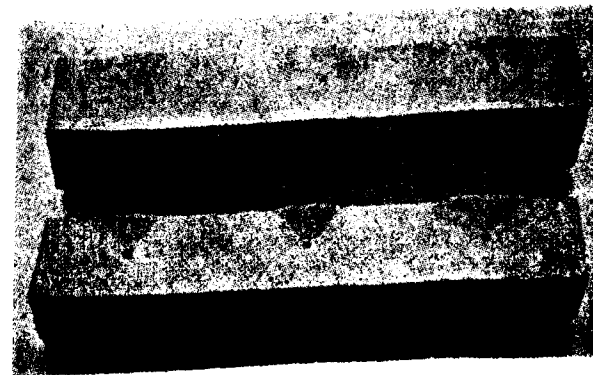


Fig. 10. Sections of welds with deep penetration electrodes executed with different speeds of travel.

2 mm. gap made by milling with depth of half the plate thickness.

Fig. 11 - Welding speed 15 cm./min.
...Welding speed 20 cm./min.
...Welding speed 25 cm./min.

Depth of penetration and height of weld reinforcement for deep penetration electrodes, made on semi-automatic machine with 2 mm. width of gap. Einbrandtiefe = Depth of penetration. Raupenüberhöhung = Height of weld reinforcement.

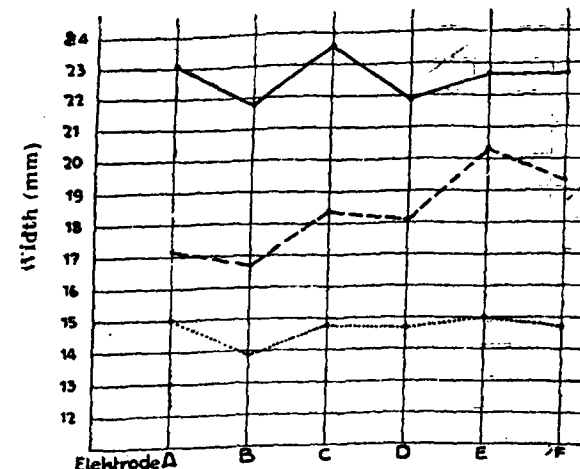
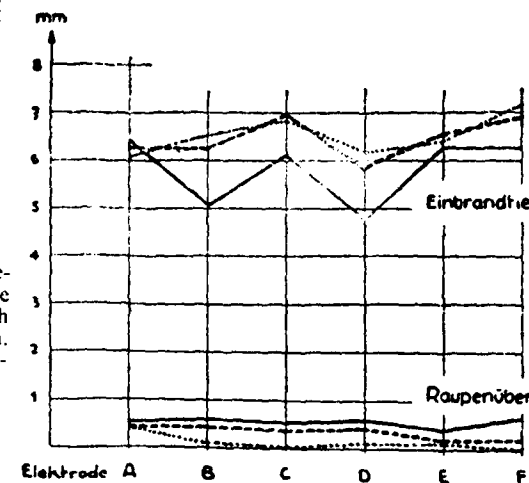


Fig. 12 - Welding speed 15 cm./min.
...Welding speed 20 cm./min.
...Welding speed 25 cm./min.

Width of weld pass with deep penetration electrode, semi-auto welded on 2 mm. wide gap.

This drawback can be overcome by producing certain newer types of low-hydrogen electrodes whose slag is so favourably constituted in quality and quantity that even heavy plug welds can be executed in one operation, provided that one electrode suffices to fill the plug because otherwise one has to use a larger number of electrodes one after another. Figure 7 shows the cross-section through a plug weld made in this way (the plug hole was prepared by drilling). By using deep penetration welding technique mentioned above, however, the preparation of plugs by drilling or punching is dispensed with. One often uses the deeply penetrating properties of these electrodes in such a way that, taking the parts to be joined by plug welding, one first digs the arc in to make a hole and fills the same simultaneously with the weld metal from the electrode in one operation. It is obvious that the application of this technique is limited by the amount of maximum penetration obtainable with these electrodes so that in the above case, the plate or the profile which is to be joined to the member under it, should not be thicker than about 5 mm. Fig. 8 shows photographs of such welds in which the top plates are 1½, 3 and 5 mm. thick, and the cross-section across these welds is shown at the bottom of the figure.

Information gathered from practical development work on the recently designed deep penetration electrodes ought to be of value to the users of such electrodes. Neumann has constantly pointed out in his papers that in making butt welds or fillet welds the amount of gap maintained at the joint critically influences the quality of weld, particularly the amount of penetration obtained. There are other factors also which play an important role: for example, the rate of travel of the electrode. In order to fix the amount of gap and the rate of travel of the electrode for experimental technique, the following testing procedure was adopted in the research laboratories of Oerlikons on the recommendation of H. M. Schnadt. The electrode to be tested

was fixed in a semi-automatic machine, which guarantees that welding conditions are maintained at constant values and which records current and voltage values on a graph, and a weld head was laid with 3 different speeds of travel (15, 20 and 25 cm/min.)

(a) as a simple bead run on plates 20 mm. thick, (b) on plates of same thickness but with 10 mm. deep grooves prepared beforehand by milling (fig. 9). We selected 2 mm. as the general width of grooves, though it is obviously possible to choose this width as one finds convenient. The case (a) deals with conditions where no gap is present while case (b) with those where a gap of 2 mm. exists. The above testing set-up as adopted by us furnishes a ready and accurate gap throughout the length of the joint and dispenses with preparations necessary when using two separate plates and tacking them together for maintaining the required gap. Figure 10 shows sections through welds made as in (b).

The evolution of test results is based on taking the mean values of the depth of penetration, reinforcement over the weld face and the width of the pass, calculated in mm. from the three different polished cross-sections (see figs. 9 and 10). The last two dimensions can also be of great importance for judging the suitability of an electrode according to the welding job one has in view. Eventually cross-sections at the beginning and at the end of the weld bead are also taken up for examination. As a summary of the results obtained in the recent investigations, figs. 11 to 14 give a graphical representation of 6 different results from six types of deep penetration electrodes which of course include the values of tests without a gap in the joint and with 2 mm. gap. Of the six, electrodes B and D should be ruled out because at the lowest speed of travel, (15 cm./min.) the penetration obtained was too shallow compared to that obtained in the rest of the electrodes.

The high mechanical values given by the modern deep penetration electrodes are shown

by the results obtained for the all weld metal deposits in case of electrodes A to F (Table 1). All the tests were carried out, as in the cases mentioned before, by using alternating current for welding. Table 2 gives the chemical composition of the pure weld deposits obtained in these tests.

TABLE I
All-weld tensile test and impact test values
(average values of 2 and 4 tests respectively)
for various deep penetration electrodes

Electrode	Yield Pt. kg/mm ²	Ult. Tensile kg/mm ²	Elongation % (l=5d)	Area Red %	Impact value* mkg/cm.
A	53.7	62.3	22.3	61.2	7.4
B	49.1	54.8	26.2	63.3	12.0
C	49.0	55.4	25.4	61.8	11.1
D	45.6	50.4	27.3	62.1	10.6
E	45.8	50.6	25.6	50.6	10.0
F	45.3	51.2	25.3	50.8	8.4

* VSM— = nearly DVM—tests.

Weld Metal analysis of various deep penetration electrodes

Electrode	C%	Si%	Mn
A	...	0.07	0.82
B	...	0.09	0.25
C	...	0.09	0.21
D	...	0.06	0.16
E	...	0.06	0.20
F	...	0.06	0.29

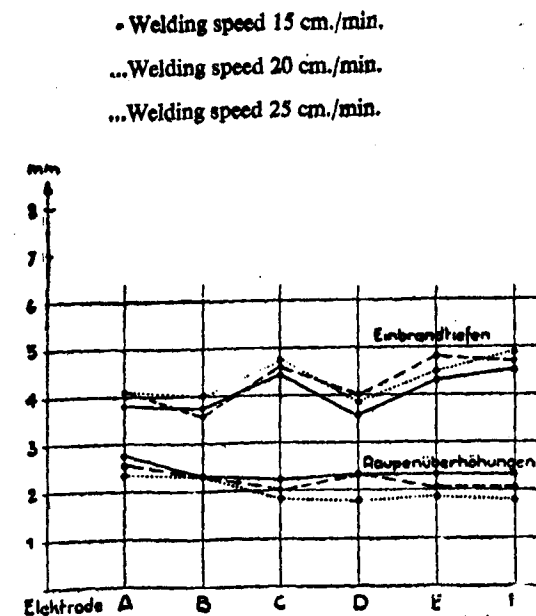


Fig. 13. Depth of penetration and height of weld reinforcement in deep penetration electrodes, semi-auto, welded without gap.

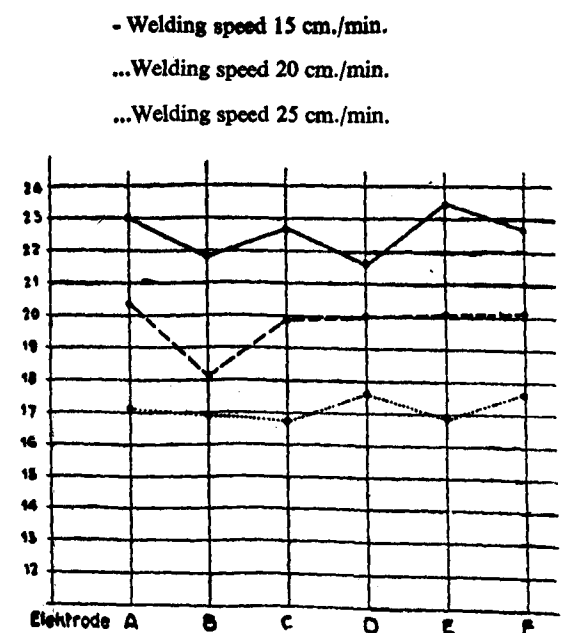


Fig. 14. Width of weld pass with deep penetration electrode, semi-auto, welded without gap.

However, it is to be remembered here that one must draw only an approximate conclusion from the tensile values and chemical composition of the pure weld metal of deep penetration electrodes because, in contrast to normal electrodes for hand welding where the weld joint consists, for the greater part of the deposit obtained from the electrodes as such, the weld joint in this case consists mostly of the fused and resolidified parent metal. Therefore for qualification of weld joints made with deep penetration electrodes the mechanical properties and chemical analysis of the pure weld metal from these electrodes are not of much consequence, but the weld joints must be tested on their own individually since they are affected largely by the parent metal composition.

It is to be understood that for the ultimate

choice of a deep penetration electrode, one should consider not only the depth of penetration and the quality of weld metal but also performance characteristics such as spatter loss, joint profile and ease of slag removal. A further factor, which is of special importance for the reliable application of the electrode, is whether it will give a weld joint reasonably free from cracks and porosity on the grade of steel on which it is meant to be used. Speaking of this, testing methods of a widest variety are employed during the development of every electrode. Not only in the case of deep penetration electrodes but in ease of every type of electrode, a product introduced in the market by a conscientious manufacturer represents the final step taken after hundreds, if not thousands, of experiments.

(Courtesy J. B. Advani oerlikon Co., Ltd., Bombay)

FILLER

A primer paint which combines the properties of a rust killer and a rust inhibitor has been developed by a Yorkshire Company—A. Sanderson & Co., Ltd. It is claimed to neutralise rust up to 0.001 in. thick, anything in excess of this being exceptionally thick and removable by wire brushing.

Neutralisation is achieved by a phosphoric acid content which turns the rust into iron phosphate. Where the rusting is less than 0.001 in. thick a lighter than normal coating is recommended to ensure that excessive amounts of free acid are not present. Although intended as a primer only, an unprotected coat gives protection for several months, but owing to the thin nature of the film, maximum protection is only achieved when the total film thickness is built up to the recognised minimum of 0.005 in. Any type of oil or synthetic paint can be used on top of the primer. One of the advantages is that it dries within about an hour and adheres strongly even in the presence of water. The company sees this as an aid to speedier turn round of ships in dry dock, and for all concerns where rust is an ever-present problem.

The paint is currently being tested by steel structural engineers and ship owners in many parts of the world including the United States, the Middle East and Europe.

B.I.S.

MARCH, 1960

I. C. F. CRICKET TEAM BRINGS HOME C. P. JOHNSTONE TROPHY

Wins First Division 'B' Zone Championship.

The I.C.F. Cricket Team annexed the C. P. Johnstone Trophy this year by winning the First Division (B) Zone Championship. The I.C.F. Cricket Team starting from the 'C' Division in 1956 has had the distinction of earning promotion every year. The Team also won the Championship in 'C' and 'B' Divisions and were runners-up in the First Division 'C' Zone. They now enter the First Division from the next season onwards.

Following are the players of the Team, who have enabled and assisted the I.C.F. Cricket Team to achieve the coveted place that it is now in.

recipient of the "best bowler's cup" in the City-Districts matches for two years in succession. He is the Captain of the I.C.F. Cricket Team.

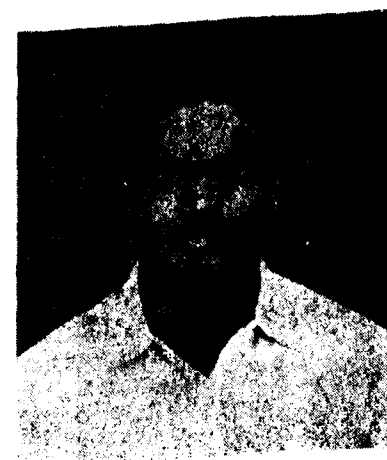
G. R. Yuvarangam : An opening bat, Shri Yuvarangam was the captain of the I.C.F. Cricket Team till the last year. Much of the credit for the present position of the team goes to him.



V. M. Swamy : An excellent all-rounder, he is indeed an asset to the team. His performance with bat and ball has been good throughout the season. He has represented Madras in the Inter-Association match against Mysore.



T. D. Doriappan : An opening bat and keeps the wicket. He has been the most consistent batsman of the team this year. He has represented the city against the districts in 1959 and has also played for State Sub-Junior Team.



Prakash Bangara

Prakash Bangara : Right Arm opening bowler and a good bat. He has represented the State against Mysore, Travancore-Cochin and Andhra in the Ranji Trophy. He was the

RAILCOACH

A. R. Prem : Shri Prem who is from Hyderabad represented Hyderabad in the Inter-Association matches before joining I.C.F. A new-comer to the team, Shri Prem has done well this season.



M. Sunderrajan : An opening batsman. Shri Sunderrajan has got some very good performances to his credit.



James Velu : A left arm medium pace bowler. Shri Velu is also a very useful batsman. He had the credit of taking 5 for 10 against Harnath C. C. in the First Division 'B' Zone match.

Sivaprakasam : A fine all-rounder is Shri Sivaprakasam, a right hand medium pace bowler, steady bat and a good fielder as well !! He is a very useful member of the team and has been mainly responsible for turning many a probable defeat into victory.



Padmanabhan : Right hand medium pace bowler and a hard hitter. He has taken a good number of wickets this season and has been a good run getter too.

Chitti Babu : He is a right hand off spinner and a steady bat.



M. Gopal : A brilliant fielder in any position. Shri Gopal is also good with bat and ball.

Shri Seethapathy : Is another new comer to the team. He is a good bat and equally a good spin bowler. And he is a good fielder too.

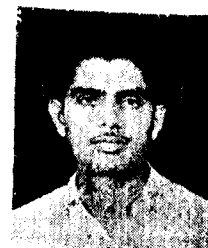


Makiappan : An all rounder, Shri Makiappan is in the team from 1956.



Dakshinamoorthy : A good batsman he also does a nice job behind wickets.

Krishna Rao : Right arm medium pace bowler. He is a useful bat too.



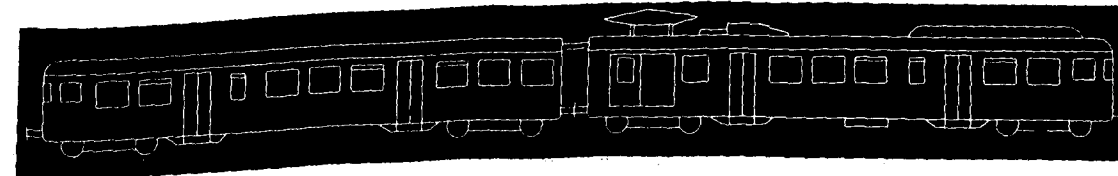
Narayana Rao : An aggressive bat, medium pace bowler and a brilliant fielder !!—an asset to the team indeed.

Mention should be made of Shri B. S. Alva whose service the I.C.F. team was unlucky to miss in the middle of the season. A fine all-rounder Shri Alva was a boon to the team. In a few matches he played for I.C.F. this season he scored two centuries.

The I.C.F. Cricket team is now in fine

mettle and is entering First Division with confidence. They have to face tough teams and it is hoped that I.C.F. team will maintain their conquering spree. Well, let us wish them the best of luck and for the present our hearty congratulations on their winning the C.P. Johnstone Trophy.

A. R. VENKAT.



Schlieren

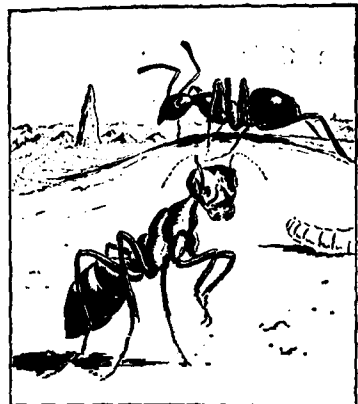
The Swiss Car and Elevator Manufacturing Corp., Ltd., Schlieren-Zurich (Switzerland) is one of the pioneers in building and technical development of Railway Coaches, Tram Cars, Trolley Buses, Lifts, Escalators



RAILCOACH

DID YOU KNOW?

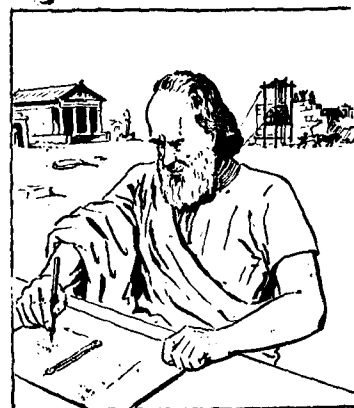
By SCIC



Some scientists believe ants may some day succeed men as world rulers, and might even be biologically superior to human beings. To strengthen their theories, these scientists offer evidence that even at their present state of evolution, ants possess civilizations strikingly like those of man, but usually more efficient.



Aspirin is one of man's safest and most universal medicines, yet no one knows precisely how it works its wonders of relieving pain, reducing fever, and lessening rheumatic symptoms and other body inflammations.



The elevator is not new. Archimedes the ingenious Greek, invented the first one in 236 B.C. but 2000 years passed before a safe one was perfected for passenger use in 1852. The inventor was American Elisha Otis, then a foreman in a bedstead factory.



Plants have ingenious means of getting enough sunlight. Some mosses in dimly lighted places grow a covering of clear gills that act as focussing lenses to gather the meager light and concentrate it in the chlorophyll.



Some 300,000 elevators in the United States carry more than 25,000,000,000 passengers a year—more than all other public carriers combined, including railroads and buses. In one New York building which has elevators to carry fully loaded trucks to various floors, fire engines were lifted directly to an upper-story blaze.



When Alexander Graham Bell, inventor of the telephone, went to his workshop to wrestle with scientific problems, he would usually stuff a towel around his telephone there so it could not interrupt him.

U.S.I.S.

MARCH, 1960

What Is Jazz?

(The following article traces the origins and development of jazz—a form of music that was born, and has found its richest expression, in the United States.)

Before attempting a definition of jazz, it is best to define what jazz is not. Jazz is not the music one generally hears pouring out of juke boxes; nor is it the music served up by most dance bands. The fact that thousands of people equate popular, commercial, mass-produced music with jazz does not make the two identical.

The origin of the word "jazz" is obscure. Some have traced an affinity to the French "jaser", to chat idly, but this is a doubtful link. Probably the term is American in origin, an inspired word coined by some unknown labourer in the Deep South who found its sound exactly fitting the sense. In any case "jazz" was common currency towards the end of World War I, even though the spelling ranged through "jas", "jass", "jatz" and various other forms.

Vigorous, pliant, remarkably thick-skinned, jazz has withstood assaults from the orthodox, endured abuse from people who have understood neither its purpose nor its techniques—and flourished despite its detractors.

Born on the wrong side of the tracks, it has won through to respectability by the simple expedient of converting the leaders of the opposite faction. Fifty years ago jazz was heard only in poolrooms and shady dives on side streets; today it is performed in the same concert halls used by the world's great classical orchestras.

Jazz, let us be clear, has undergone a continuous evolution. It is impossible to fix exact dates for its origin, for in embryo it has always been part of the traditions and consciousness of the Negro race. Jazz started out as vital, earthy, authentic folk music, a spontaneous embodiment of the joy of a people

whose pathos found its deepest and truest expression in the Spiritual. Today it is complex, highly developed, in spite of its comparative lack of restrictions, a far cry from the simplicity of a folk form.

The rhythms of jazz are African in origin, but the two other components, melody and harmony, have always been universal. The early jazzmen, innocent of book learning, combined the barbaric drum beats of their ancestors with hymn tunes, European waltzes, polkas and quadrilles, tossed in chants from the Caribbean and bits and pieces from here, there and everywhere—and created something rich and strange and entirely new.

The immediate ancestor of modern jazz was the "blues", which was a pure form of Negro music sung with extreme flexibility. It was never the same twice running, for it was meant to express emotion, and as the emotion changed, the song changed also.

This brings us to the one feature which sets jazz apart from other music; it is essentially an improvisation. Even when it "came of age," with a codification of rules and a system of its own, it never shed its improvisatory character. No jazz musician worth his salt will imitate a rival; he is always trying to break new ground, to create a new sound, to embellish the basic melody with ornamentation expressive of his personality and his alone.

Incidentally, it is probably this lack of formalism which has won jazz so many devotees among Indian musicians. For Indian music also demands great improvisatory skill in the artist.

Jazz is a generic term that includes such distinct styles as New Orleans, Dixieland, rag-

RAILCOACH

25

time, hop, cool jazz and progressive jazz, and often touches the boundaries of swing and "popular" music.

Dixieland, of which Red Nichols has been one of the leading exponents for the last 40 years, is one of the oldest schools of jazz. Specifically, it is jazz in the style popularly associated with the Original Dixieland Jass Band, the first known group to be billed as a jazz band. That historic event occurred in Chicago in 1914, when a patron suggested that the band put some jazz (then spelt "jass") into their performance.

When one hears the term "Dixieland" today, it usually refers to smallband jazz to jazz music improvised in distinction from that played from written arrangements. Most Dixieland ensembles consist of trumpet, trombone, clarinet, piano, bass and drums. The Red Nichols band that Indian audiences will shortly hear has all these instruments with the exception of the bass, which is replaced by the bass saxophone.

Though Dixieland's popularity has undergone various changes during the last half century, recent years have seen a revival of

interest in this vigorous and down-to-earth school of jazz. And today, in spite of the advent of the new "cool" jazz, Dixieland still claims thousands of adherents throughout the world.

The modern "progressive" school of jazz was born in 1940. Till then jazz had stuck to a rigid "dance beat" with its main stress on the second and fourth accents. But in the hands of men like Charlie Parker and Dizzy Gillespie the beat became fluid, a trend that was extended by big outfits such as Woody Herman's and Stan Kenton's.

It is impossible to be dogmatic about the future of anything as changeable as jazz. But this much is certain : jazz has cut its teeth, is old enough to avoid empty glitter for its own sake and is highly developed enough to be able to shed the sense of inferiority that hampered its earlier growth. Today it is music like any other music. It has its traditions, it has its character, it has its artistic hierarchy. It has never remained stagnant. Above all, it has retained its link with the basic, elemental feeling every man has for rhythm.

U.S.I.S.

" Darling," asked the newly wedded wife, " will you love me if I grow fat ?"

" Certainly not," said the husband, " I promised for better or worse, not through thick and thin."

* * *

" Yes, my son went out West several years ago to make a fortune."

" And what is he worth now ?"

" I don't know, but six months ago the authorities were offering Rs. 1,000 for him."

AWAKE AND BE GONE!

BY

P. R. SUNDARABASHIAM

No longer in slumber,

I am awake and alive,

No longer in torpor,

I know how to thrive,

Conscious of my muscles, and mind,

I'll you drive.

For good from the acquired place

and my niche carve

Be gone, you, the unthought of
upstarts.

The fiery sparks of resurgence are
aglow now,

The once dormant desire to regain
my proud place

And stand my firm ground
in the first row

And outshine you, upstarts once
for all in the race.

So I'm awake, Be Gone, Star !

Mind, meagre minds, my mind is
made up,

My all organs are active and agile,

All fretful and frightful fancies
having gallop'd.

And, free and first, I'll soon at
you smile.

SANTINIKETAN—THE ABODE OF PEACE

A few miles from Bolpur on the Eastern Railway is the Great Poet Tagore's dreamland 'Santiniketan'. This article relates to its background

Should you ever come to Calcutta and if you are interested in Indian culture, you cannot afford to miss the chance of a visit to "Santiniketan". Bolpur—the rail head for Santiniketan—is about 100 miles north of Calcutta.

"Santiniketan" or the "Abode of Peace"—as its very name suggests, is an invitation to the innermost cravings of our heart amid the storm and stress of modern life. And when we think of its long and intimate association with that towering genius of our time—poet, author, artist and musician Rabindranath Tagore—the magnetism of the place becomes irresistible.

Turning Dream into Reality

Santiniketan means far more to India than Stratford-on-Avon to England. Stratford-on-Avon is honoured simply as the birth-place of Shakespeare; Santiniketan is a place where Tagore not only dreamt and wrote but also thought and worked and transformed a dream into reality.

In his autobiography the poet wrote: "The young mind should be saturated with the idea that it has been born in a human world which is in harmony with the world around it. And that is what our regular type of school ignores with an air of superior wisdom, severe and disdainful." The poet felt that we might become powerful by knowledge, but we could attain fulness only by sympathy. He wrote, "The highest education is that which does not merely give us information but makes our life in harmony with existence. But we find that the education of sympathy is not only systematically ignored, but is severely repressed We rob the child of his earth to teach him geography, of language to teach him grammar." At Santiniketan, the poet translated his educational theory into practice.

On a certain day in the month of February in the year 1862, Maharshi Debendranath, Poet Tagore's saintly father, while seeking a suitable spot to establish his hermitage, first set foot on the barren stretch of a vast tableland that was to grow and blossom into Santiniketan.

The sun was just setting in the west. Maharshi's palanquin arrived and was put down under a grove of *Saptarnis*. His mystic soul was touched with the majesty of the open fields merging in the horizon and its brooding loneliness.

Maharshi decided to build here his Abode of Peace. He acquired a few acres of land in 1863. To the east of the *Saptarni* trees, a two storied building went up in the wilderness and on its facade was inscribed a text from the *Upanishads*. The house was named Santiniketan.

In 1873 Rabindranath, a boy of 12, paid his first visit to Santiniketan with his father. In his reminiscences, the Poet has described the experience and excitement of his first journey by rail. Little did he know at the time that he would be called upon one day to re-build Santiniketan—as a residential school for children like himself.

Synthesis of Cultures

In 1901, Rabindranath started the school at Santiniketan, the college and the University came 20 years later. The classes were and still are held in the open under the trees. Rabindranath's dream was to make Santiniketan a centre of India's heritage, to bring up the multi-coloured Eastern cultures into more intimate relationship with western science, and establish through the fellowship of study and humanitarian work, the concord of East and West.

The Viswa Bharati University comprises the following departments:

The Patha-Bhabana or the school; the Siksha-Bhabana or the college; the Vidya-Bhabana or the School of Post Graduate Research; the Cheena-Bhabana or the School of Sino-Indian Studies; the Kala-Bhabana or the School of Fine Arts; the Sangit Bhabana or the School of Music and Dance; the Rabin-dra-Bhabana or the Museum and Academy of Tagore Studies; the Deenabandhu-Bhabana or the Andrews Memorial Hall for Christian Western Studies; the Hindi-Bhabana or the School of Hindi Studies; the Vinaya-Bhabana or the Teachers' Training Institute and the Grantha-Vibhaga or the Publications Department.

Besides these, Sriniketan at Surul, a mile and a half away, is an embodiment of the Poet's ideas on rural reconstruction and co-operative effort. The Institute of Rural Reconstruction is concerned mainly with the problems of health, education, culture and social welfare. It also includes the Silpa-Bhabana or the Rural Industries and Handicrafts Departments.

Ideal School

Till his last day, the poet worked hard for the institution of his dream. And before he died in 1941, he had the satisfaction of seeing his dream come true. He had succeeded in developing Santiniketan into an ideal school, trying to recapture the lost harmony of the ancient hermitage-schools of India, where in tune with the peace of nature, life was simple and natural and education aimed at realising "the fullest growth and freedom of the soul".

Something of that dignity, simplicity and spontaneity still lingers in the atmosphere at Santiniketan in spite of its many growing modernities. You feel it as you pass by the open-air classes, listen to the music that fills

the air, or watch the many-sided expression of social life.

Santiniketan has not remained an isolated and archaic hermitage but has moved with the times, attempting a synthesis of the new and the old—the dynamic present and the inspiring past. The genius of Tagore, and the eminent scholars it attracted from all over the world, has made this place a centre of international culture and truly has its university been named "Viswa Bharati" or world university where students are not only Indian but cosmopolitan.

By an Act of Parliament the Government of India has made Viswa-Bharati a statutory university, but its Chancellor, Sri Nehru, wants to preserve its distinctive character.

Many of the buildings at Santiniketan are architecturally elegant. The Kala Bhavana contains an art gallery and the library has a collection of rare manuscripts. Then there are many houses and huts where Tagore lived for a time—and then moved into another, and another—urged by his desire for new surroundings. Most of the things associated with Rabindranath have been preserved in "Uttarayan", an imposing building in oriental style, where Tagore lived for a long time.

Santiniketan leaves an indelible impression in the minds of all those who have lived there. That is why at all their gatherings they lustily sing:

"She is our own,
The darling of our hearts,
The Santiniketan.
Our dreams were dreamt
in her arms.
Her face is a fresh wonder of love
Every time we see her,
For she is our own,
The darling of our heart."

(Courtesy—"Eastern Railway Magazine.")

heard this one ?

The little old lady was saying her final goodbyes to the minister, who was leaving the parish. "I'm am so sorry you're going," she said. "I never knew what sin was until you came here."

* * *

"Now, if there's anything you want," the landlady said to the new tenant, "just let me know and I'll show you how to do without it."

* * *

The wife of a Cleveland man seemed to be on a perpetual clothes-buying spree, and her harried husband was near distraction trying to keep all the bills paid.

"You shouldn't let your wife run up big bills like that," advised a friend. "Why don't you put a stop to it?"

The husband shrugged his shoulders. "It's much easier," he explained dejectedly, "to make arrangements with my creditors than with my wife."

Half a dozen rural philosophers sat around exchanging bits of earthy wisdom. The discussion got onto education, and most of them agreed that a man without an education was out of luck.

"I don't go along with that," declared one farmer in rebuttal. "I ain't edjicated a mite, an' it seems to me when you ain't edjicated you just have to use your brains!"

* * *

In the course of a discussion of atomic theory, a university instructor wrote an equation on the board and stated that a certain number of electrons were involved. From this he developed an entire board full of equations, winding up with the remark, "And so you see we have five less electrons than at the start. What has become of them?"

Not a sound from the class. Impatient, the instructor snapped, "Come, come, gentlemen! Where are those electrons?"

It was time for action, and from a rear seat came a gruff voice: "Don't nobody leave this room!"



Bharathi Scout Group, I.C.F. won two trophies, at the recently held Inter District, Inter Railway Rovers Competition. The photo shows the team with District Commissioner Shri M. Lal, Asst. Dist. Commissioner Shri T. Ram Das and Welfare Officer, I.C.F. Shri T. D. Jayaram.

THE YOUNG GEORGE WASHINGTON

BY

SAMUEL E. MORISON

Greatest of American heroes is George Washington. He was born in 1732 in Virginia, at that time a British colony. On his birthday, February 22nd, a national holiday, speeches and editorials extol the sterling virtues of the Revolutionary Commander-in-Chief and first President of the United States. But in the following article Professor Samuel Eliot Morison recalls an earlier Washington, not yet the paragon, a very human being.

Washington is the last person you would ever suspect of having been a young man. In American folklore he is known only as the priggish child hero of the cherry-tree myth, declaiming "Father, I cannot tell a lie. I chopped it down with my little hatchet," or as Commander-in-Chief of the Revolutionary army, or the "Father of his Country", writing a farewell address. Yet as a young man he was impatient and passionate, eager for glory in war, wealth in land and success in love. Even in maturity his fierce temper would sometimes get the better of him. It was only through the severest self-discipline that Washington attained his characteristic poise and serenity.

His father died when George was 11 and he was not given a gentleman's education, as he became painfully aware when at adolescence he went to live with his half brother at Mount Vernon. At 16, just when a youth is fumbling for a philosophy of life, he came into intimate contact with the Fairfax family. He had procured books, progressed further than his schoolmaster could take him and so qualified to be surveyor to Lord Fairfax. This great gentleman and landowner required an immense amount of surveying in the wilderness of Virginia's western frontier. George William, Lord Fairfax's young cousin, was Washington's companion in surveying expeditions and Sally, the lady with whom Washington was so happy (and so miserable) as to fall in love, was George William's wife.

Living in Virginia at that time was like riding on the sparkling crest of a great wave. At Mount Vernon, on the verge of the wilderness, one felt the zest of sharp contrasts. On the one side were mansion houses where young Washington took part in all the sports and pastimes of his social equals: dancing and

card playing and flirting with the girls. He bet small sums at cards and larger sums on the ponies, and was a good loser. On the other side of Mount Vernon were log cabins, and all the crude elements of American life: pioneers and other poor whites who as insubordinate soldiers would prove the severest test of Washington's indefatigable patience.

When he was 20 years old, his brother Lawrence died. George stepped into his place as proprietor of Mount Vernon. At this stage of his life he did not greatly enjoy the exacting task of running a great plantation; he thirsted for glory in war.

As one of the first landowners in the country, he was commissioned major of the militia and at 21 volunteered for a highly confidential and difficult 1000 mile reconnaissance through the back country from western Virginia to the Ohio River and almost to the shores of Lake Erie. He carried a British demand to "know the reasons" of the French "for this unjustifiable step in invading our lands" and returned with word that it was the "absolute design" of the French to "take possession of the Ohio."

This young man showed a caution in wilderness work, a diplomatic skill in dealing with Indians, and a courteous firmness in dealing with French commanders that would have done credit to a man twice his age. But on his next mission youthful impetuosity prevailed. Unmindful that one must always let the enemy make the first aggression, our young lieutenant-colonel fired the shot that began the Seven Years' War.

Washington's shot in the silent wilderness brought the French and Indians buzzing about his ears. He hastily constructed Fort Neces-

sity, which thus became the site of his first major command and his only surrender.

In four years Washington learned much from war. He found it necessary to discipline himself before he could handle men. He learned that war was simply hard, beastly work.

In the spring of 1758, he met, wooed, and won a housewifely little widow of 27 named Martha Custis.

Washington allowed himself to be elected that same year to the Virginia Assembly. He had no gift for speaking or for wirepulling; he showed no talent or desire for political leadership. But he learned at first hand the strange behaviour of *Homo sapiens* in legislative assemblies.

So at 27 George Washington was not only a veteran colonel who had won the confidence and affection of his men, but a member of the

Virginia Assembly, a great landowner, and a husband. His youth was over, and he had the means for a life of ease and competence; but the high example of antique virtue would not let him ignore another call to duty. When it came in 1775 his unruly nature had been disciplined by the land and the wilderness, by philosophy and a noble woman, and by his own indomitable will, to become a fit instrument for a great cause.

If he had failed, historians would have blamed the Continental Congress for a political appointment of a provincial colonel with an indifferent war record. If, like so many leaders of revolution, he had merely achieved a personal triumph, or inoculated his country with ambition for glory, the world would have suffered from his success. But Washington could not fail his country. A simple gentleman of Virginia with no extraordinary talents had so disciplined himself that he could lead an insubordinate and divided people into ordered liberty and enduring union.

A new laboratory, belonging to the Coil Spring Federation Research Organisation, Sheffield, to be opened in the U.K. on March 24, is probably the most comprehensive of its kind for research into all forms of springs and spring materials. It will enable research to be carried out on springs made from the finest wires up to bars of 2 in. diameter. In addition it will be possible to study materials in wire and strip form, and metallurgical investigations will be undertaken on a very wide range of ferrous and non-ferrous alloys.

The organisation's research programme includes work to determine the influence of type of material, heat treatment and surface finish on the fatigue life of heavy duty springs; and the effect of non-metallic coatings on fatigue life. Despite its name the Research Organisation is not interested solely in coil springs; the staff, under the Director of Research, Mr. R. Haynes, is equally concerned with leaf springs and torsion bars. The organisation works in collaboration with the Department of Industrial and Scientific Research and is enabling the spring industry—and thus almost every other industry—to advance in an age when springs are constantly being called upon to work efficiently under more and more arduous conditions.

March of Science

New Machine Functions Like A Man

The Hughes Aircraft Company of Culver City, California, has produced a Remote Control Handling Machine designed to handle hazards too dangerous for man to encounter, such as rescue work at fires, mine disasters, and gas explosions. It should have its eventual role in exploring the moon.

This new example of man's own inventive genius is called the Mobot Mark I. Its distinguishing feature is its complete self-contained mobility guided by its television camera eyes and its microphone ears. It's a machine delicately responsive to 100 separate commands conveyed through a 200 foot long cable. The operator uses two TV monitors to see what the Mobot is doing, one for each of the Mobot's eyes.

This 2½ ton model has been specifically designed for a New Mexico company for work in a radioactive room or hot cell. Each of its 3 foot flexible steel arms can lift 150 pounds, can handle items too hot for human hands to touch. Each Mobot hand has a 200 pound grip. Future models will weigh up to 50 tons. Besides heavy duty work, the Mobot can perform the most delicate operations, such as taking cards from a rack and handling a dentist's drill with a firm and steady hand.

Giant Balloons for Communications Experi-

ment: The U.S. National Aeronautics and Space Administration is planning to send into orbit soon giant aluminium-coated balloons to experiment in long-range communications. The balloons are one hundred feet in diameter and they weigh less than 190 pounds. They are made of paper-thin plastic coated with a microscopic layer of aluminium. The material is so thin that the entire balloon can be packed into a package less than one meter long.

Once the folded balloon is shot beyond the earth's atmosphere into what is almost a vacuum, the pressure of sea-level atmospheric air trapped within will start to inflate it. The balloon carries a bottle with about two kilograms of water. This bottle opens automatically and the water will turn instantly into steam, thus completing the inflation process.

A prototype of the balloon was recently fired aloft in a rocket in the Washington D.C. area, the balloon attaining an altitude of 250 miles at a speed of 7000 miles an hour. It was visible for several hundred miles.

When placed in orbit, the balloons will be used as reflectors for high frequency radio and television signals. At present these signals cannot readily reach receiving stations more than 50 to 100 miles distant because they are over the horizon. But when the signals are bounced off one of these balloons, they should be heard for thousands of miles.

A French sailor asked a member of the Royal Navy why the English were so victorious at sea. "It's because we pray" the English tar replied.

"So do your opponents."

"Yes, but we pray in English."

WELFARE NEWS

Staff Council

A special meeting of the Staff Council was convened on the 9th March 1960 to decide the workshop holidays to be observed during the year 1960.

I.C.F. Colony School

As the school-going children residing in the I.C.F. Colony are invariably put to great hardship and inconvenience in having to attend Schools located far distant from the I.C.F. Colony, for some time past the question of providing a full-fledged Middle School to cater to the needs of the school-going children residing in and around the I.C.F. Colony has been under the active consideration of the Administration. The Welfare Wing is happy to announce that the Railway Board have agreed to the management of the I.C.F. Colony Elementary School being directed to run a Middle School also in the I.C.F. Colony. It is proposed to open the Middle School in the

I.C.F. Colony with Forms I to III with effect from the academic year 1960. The provision of a Middle School in the Colony would indeed meet a long-felt amenity of the residents of the I.C.F. Colony. A register will be opened in the first week of May in the school and all parents desirous of admitting their children in the School in Forms I to III may register their names early.

Visit to Railway Hospital

The Welfare Inspectors have visited the Southern Railway Hospital, Perambur on the 5th, 12th and 24th March 1960 with a view to contact the I.C.F. employees undergoing treatment as inpatients in the hospital. These periodical visits by the Welfare Inspectors have had a good effect on the morale of the patients.

Confirmations of Staff

244 confirmations have been made during March 1960, bringing the total number of confirmed employees in the Factory to 3,602.

Work carried out by Mr. W. E. Lewis, Assistant Director of Britain's Tin Research Institute, on the use of polyethylene glycol as a vehicle for acid fluxes has shown that the flux spreads more smoothly over a wider area and gives scarcely any sputtering. Dipping the bit is also easier, since the solution does not boil as water flux does, in contact with the hot iron.

Used on steel the new flux spread evenly over nearly twice the area covered by the water flux and the solder followed the flux closely. Water flux also produced severe rusting on standing for a few days; the polyethylene glycol flux did not; and the flux remaining after soldering was easily washed away. The new solvent is preferable to ethyl alcohol as a medium for resinous fluxes, since its higher boiling point reduces evaporation and also the excessive pick up of resins which gives trouble, for instance, with printed circuits.

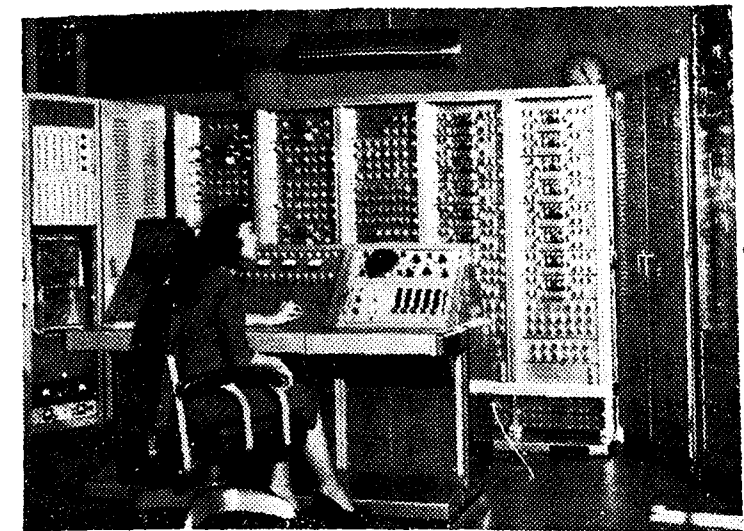
Fluxes tried included hydrazine hydrochloride and bromide, organic amine hydrochlorides and acidified resins, as well as the usual zinc chloride. Further advantages of the polyethylene glycol are that its flash point is high, ensuring a low fire risk, there is no unpleasant odour, and no risk of intoxication from fumes.

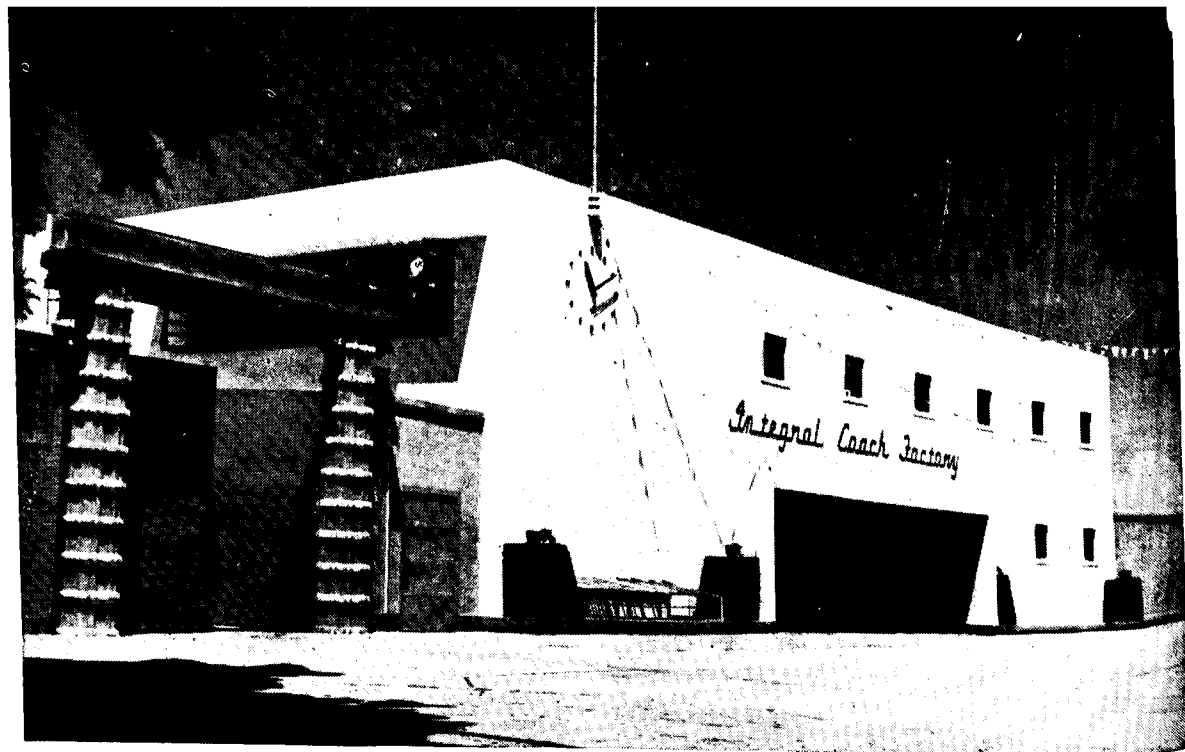
B.I.S.



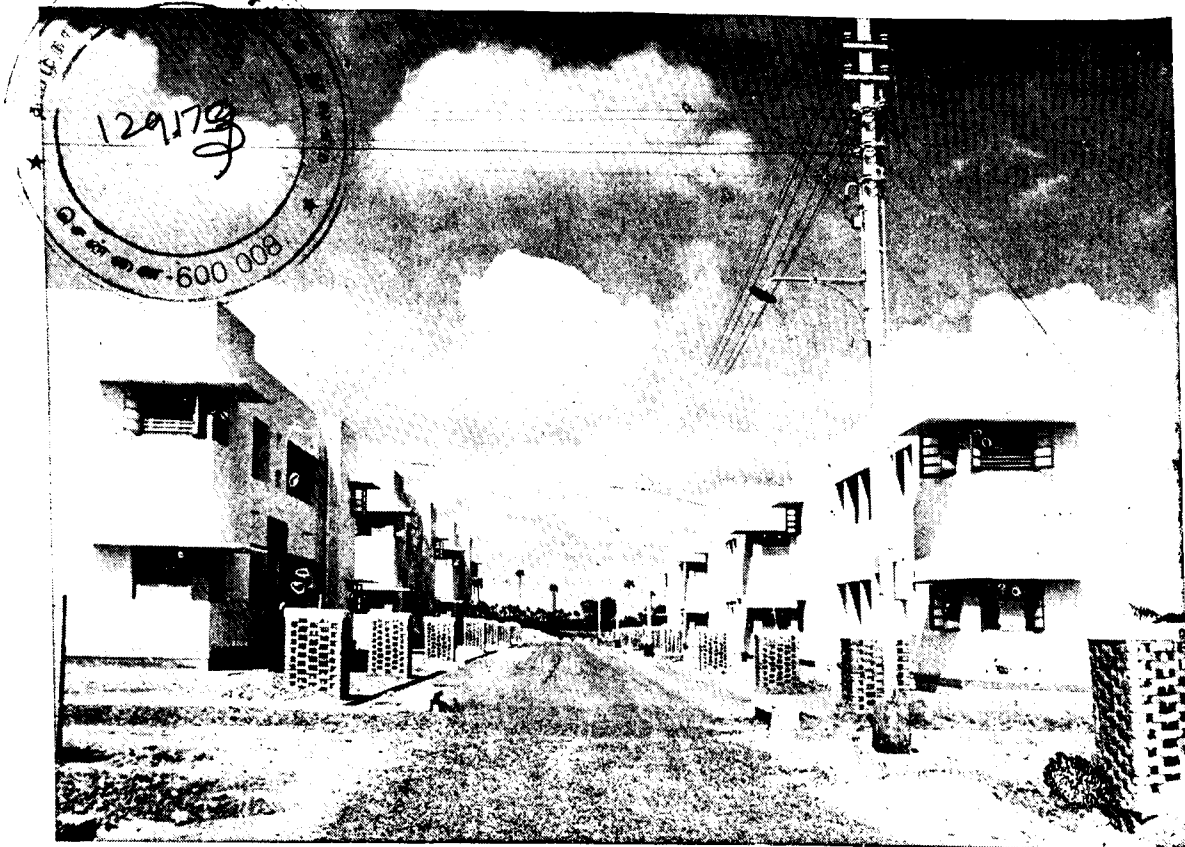
Space couch fitting:—Allen B. Shepard, Jr., one of the seven Project Mercury astronauts now undergoing training in the United States, is fitted with a molded foam plastic couch for use in human centrifuge tests at Johnsville, Pennsylvania. The couch helps protect and stabilize the future spaceman during simulated orbital flights. Molded space vehicle couches fitted for the other six astronauts are seen in the background.

Electronics unit for U.S. census —
A new electronic device is being used to handle information being gathered during the current 18th census in the United States. Named FOSDIC (Film Optical Sensing Device for Input to Computers), the machine analyzes micro-films of census returns and translates each item of information into an electronic impulse which is then recorded on magnetic tape. When the tape is inserted into a computer such as the UNIVAC, tabulations and totals are produced at lightning speed. The U. S. population when the first census was completed, in 1790, was 3,929,214. Officials estimate the total this time will be approximately 181,000,000.





Main Works Entrance



A view of the Staff Colony—I.C.F.

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DISSEMINATION

11/10/45