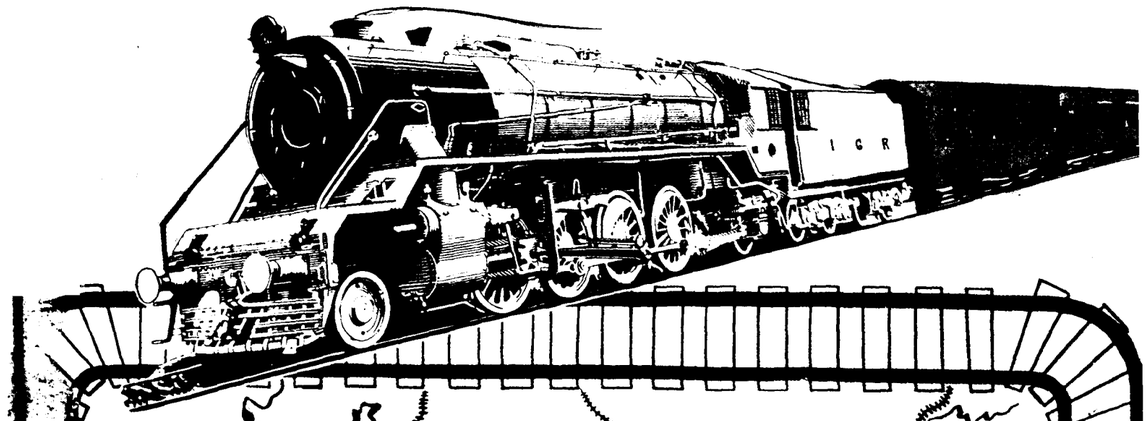
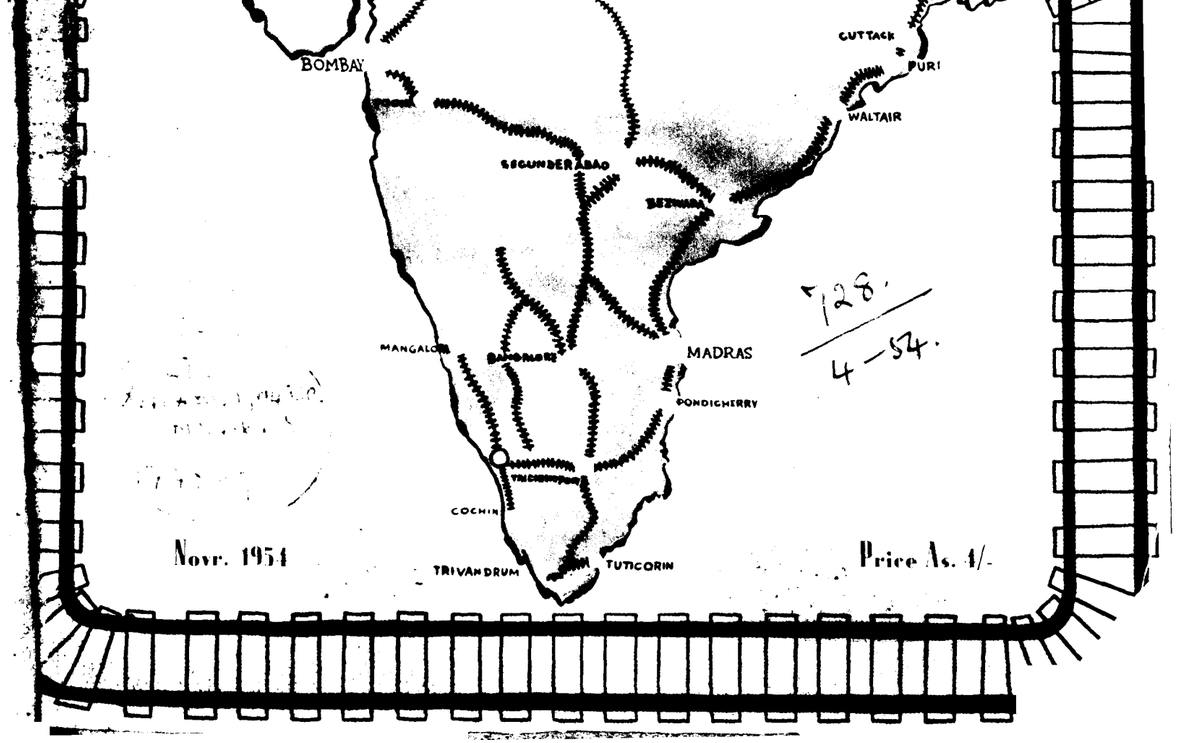
SOUTHERN RAILWAYS *Magazine*





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SOUTHERN RAILWAYS MAGAZINE

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RAILWAY EARNINGS LOOK OPTIMISTIC

LET us take a look at what the Railways have been earning up to about the middle of the financial year 1954–55. During the period April to August of this year the gross earnings of Indian Railways have touched Rs. 114.38 crores, thus showing an excess of a little less than Rs. 1.75 crores above the corresponding months of the previous year.

Revenue from passenger and other coaching traffic during the five-month period of this year has brought in a monthly average of Rs. 10.40 crores, which is higher than the monthly average for each of the years after independence by a margin of not less than 1.5 crores.

During the five-month period April to August 1954 revenues from goods traffic have come to an average of Rs. 12.15 crores. This figure has not quite come up to the budget expectation over the year as a whole.

Taking a look at the trend of passenger traffic earnings since the year 1952, it will be revealed that there is usually a decline in the latter half of the year, when monthly earnings hover around the Rs. 8 crore mark. If this trend of passenger earnings behaves in the same way during the latter half of this year, it may be safely assumed that as a whole passenger earnings may bring in an additional revenue of about Re. 1 crore above the budget expectation of Rs. 101.5 crores. A higher figure than this Re. 1 crore can only come about by some extraordinary upsurge of passenger traffic, but is hardly likely.

On the goods revenue side, the slight shortfall need not be taken as a cause for an alarming deterioration of freight earnings for the whole year, as the busy season in freight movements usually comes about in the latter half of the year. The budget forecast on the freight side is an overall increase over last year's earnings, and this is based more or less on the trends of this traffic in past years. On this assumption it is quite feasible that goods earnings will bring in an extra half a crore of rupees with a total of Rs. 150 crores.

From the viewpoint of revenue earned and expected to be earned a feeling of optimism is but natural. Yet, the efficiency of a Railway is judged on being able to provide adequate transport for the traffic and tonnage offered. What does this aspect show? The operational performance of the first five months of the year 1954–55 has actually registered a decline. In spite of an expectation of higher freight traffic the actual tonnage moved during the period April — August has gone down by 4,00,000 tons below the figure for the corresponding period of the previous year. The monthly average of 7.63 million tons carried during April — August is much below the monthly average of 10.42 million tons for the calendar year 1953. It would be extreme optimism to expect that the shortfall between the monthly average of 10.42 and 7.63 million tons is likely to be made up during the remaining months of this year.

Railway performance in the recent past on the basis of tonnage lifted reveals that the monthly average between the four years 1950 to 1953 has been from 10.42 to

10.72 million tons, whereas the monthly average during the five-month period of the current year has come to 7.63 million tons, with little hope of this figure going up during the remaining months of the year.

Time and again trade and industry, as well as commercial bodies, have complained of shortages of rail transport, and it would appear that this grievance is valid. Let us look at a few more figures. In spite of more wagons being made available for coal loading, nevertheless the monthly average of 1,04,000 wagons in the first half of 1954 is far less than the average of 1,12,000 for 1951 and 1,16,000 for 1952. Wagon capacity is also in extreme shortage on the metre gauge railways.

The figures of the Index of Industrial Production from 1950 to 1954 indicate an increase, but there appears to be a disparity between this industrial increase in production and the supply of transport capacity. Although the recent trends showing an increase in railway earnings allow for considerable optimism, yet in spite of what appears to be a financial gain, the actual operation as indicated from decline in the tonnage moved somewhat reduces this feeling of optimism. After all, it is not only financial progress that is flattering to the administration of Railways, but an assurance that shortages in transport capacity will be progressively reduced, if not eliminated. It is on this score of the availability of additional transport capacity that trade and industrial interests hope for a considerable increase.

Southend and Chelmsford Electrification Contract Awarded

A contract from British Railways for the supply and installation of overhead electrification equipment for an extension of the present Liverpool Street-Shenfield electric service as far as Chelmsford and Southend (Victoria), Essex, has been received by British Insulated Callender's Construction Company Limited.

The contract is part of a £2,500,000 scheme, announced by British Railways last year, to institute through electric services from London to Chelmsford and Southend (Victoria) by linking these towns with the already existing service between Liverpool Street and Shenfield which was completed in September 1949. The extensions mean that a further 9½ miles of route will be electirified between Shenfield and Chelmsford and a further 21¼ miles between Shenfield and Southend (Victoria).

It is hoped to complete the new electrification early in 1957 in time to relieve congestion on the London, Tilbury and Southend line, when the effects of the major civil engineering works necessary for electrification from Fenchurch Street to Southend Central begin to be felt.

The overhead equipment will be generally similar to that installed on the section between Liverpool Street and Shenfield which was also supplied and installed by British Insulated Callender's Construction Company Limited. It will operate at 1,500 volts D. C. and, on the main track, will utilise a compound catenary system consisting of a hard-drawn copper strand as the main catenary, an auxiliary catenary supported by solid copper dropper wires and a grooved cadmium-copper contact wire suspended from the auxiliary catenary by loop droppers. The three wires will be jumpered together in every span and will provide a flexible system enabling trains to run at speeds of up to 70 m. p. h.

Indian Standards Institution Notes

THE Indian Standards Institution has announced the publication of an Indian Standard covering expanded metal made from steel and used for general purposes.

The ISI has prepared this standard with a view to improving the quality of indigenous manufacture, and in implementation of the recommendation made by the Indian Tariff Board in its 1949 Report.

The Indian Tariff Board (now the Tariff commission) had estimated that the demand for expanded metal in the country was of the order of 3,000 tons a year and had opined that through strict adherence to standard specifications India could develop an export market also.

To meet the need of different types of plants manufacturing expanded metal in the country the standard specifies two long-way meshes in a number of cases for the same short-way mesh.

While the present standard confines itself to expanded metal intended for general purposes, the ISI has also under preparation a separate standard for expanded metal for use as surface reinforcement for concrete.

For the guidance of indentors a table has been included in the standard giving the sizes of expanded metal sheets normally carried in stock by Indian manufacturers.

The standard has been prepared by ISI's Basic Ferrous Metals Sectional Committee which includes nominees of: Army's Technical Development Establishment, Roads Organization (Ministry of Transport), Railway's Central Standards Office, Directorate General of Supplies & Disposals, Naval Headquarters, Bureau of Mines as also representatives of Indian Engineering Association, Engineering Association of India, Indian Institute of Metals, the Steel Re-Rolling Mills Association of India and other important manufacturing interests.

* * *

An Indian Standard Specification covering Reels for Electrical Winding Wire has been issued by the Indian Standards Institution.

This standard prescribes requirements for reels for covered, solid, round wire for winding electrical machinery and apparatus. The standard also lays down certain requirements for marking the reels and for reeling, packaging and labelling of wire. It reduces the wide range of sizes of reels at present in use with a special emphasis on design proportions. It lays down that a ratio of 2 : 1 between the flange and barrel diameters should not be exceeded. This provision is expected to lessen tension variations and to faciliate unwinding by the user. Apart from this, reel dimensions have been based, as far as possible, on sizes already in use in order to minimize modifications.

This standard has been prepared by ISI's Electrical Conductors and Insulators Sectional Committee which includes nominees of the Central Water & Power Commission, the Central Railway, Directorate General of Posts & Telegraphs, Engineer-in-Chief's Branch, the Government Test House, Indian Electrical Manufacturers' Association and other important manufacturing interests.

* * *

Indian Standard Specifications for Cotton-Covered Copper Wire and Enamelled Copper Wire have been issued by the Indian Standards Institution.

The Standard for Cotton-Covered Copper Wire sets out the requirements for High Conductivity Annealed Round Copper Wire having a cotton covering of one or two layers. It classifies the wire as 'Ordinary' or 'Fine' depending upon the thickness of cotton covering.

The Standard for Enamelled Copper Wire covers the requirements for High Conductivity Annealed Round Oil-Based Enamelled Wire used for winding coils for electrical machinery and apparatus. It specifies two classes of coverings, namely, normal coverings and thick coverings, but only a limited number of sizes having the thick covering have been included.

These standards have been prepared by ISI's Electrical Conductors and Insulators Sectional Committee which includes nominees of the Central Water & Power Commission, the Central Railway, Directorate General of Posts and Telegraphs, Engineer-in-Chief's Branch, the Government Test House, Indian Electrical Manufacturers' Association and other important manufacturing interests.

An Indian Standard prescribing methods for testing weight and uniformity of coating on galvanized iron and steel wires and steel sheets has just been issued by the Indian Standards Institution.

Zinc Coating or Galvanizing is a method of protection against corrosion applied to a greater tonnage of steel products than any other method of metallic finishing as it provides the most economical protection for products of the type to which it is properly applicable. The major established applications of zinc coating on steel products include roofing sheets, wire and wire products for all outdoor exposure, and articles fabricated from steel sheets such as cans, tanks, hardware for outdoor use, pipes etc. For proper protection of the steel, the coating should be uniform as well as sufficient.

There is as yet no single method by which both the weight of coating and uniformity of coating could be determined and hence, this standard gives two separate methods — the antimony chloride method for determining the weight of zinc coating and the copper sulphate dip test for determining the uniformity of zinc coating on galvanized iron and steel wires and sheets. A separate standard is under preparation for determining similar requirements in respect of galvanized articles other than wires and sheets such as bolts, nuts, malleable castings etc.

This standard has been prepared under the chairmanship of Shri J. S. Vatchagandhy of Tata Iron & Steel Co., with the assistance of nominees of Technical Development Establishment (Defence), Directorate General of Supplies and Disposals, Naval Headquarters, Indian Bureau of Mines, Roads Organization, Government Test House, Central Standards Office (Railways) & representatives of Indian Engineering Association, Engineering Association of India. The steel Re-rolling Mills Association of India and other important manufacturing interests.

* * *

The Indian Standards Institution has announced the publication of an Indian Standard Specification for Malleable Iron Castings.

Malleable iron castings are useful where the duty conditions call for a material which has resistance to shock, is ductile and is easily machinable. These castings, while not strictly malleable, are soft and can be bent by pressure or hammering without fracturing. Depending upon the process of their manufacture, malleable iron castings are known as white heart or black heart castings.

This Indian Standard covers the requirements for both black heart and white heart malleable iron castings, classified into three grades. It has been recommended that castings of Grade 1 be ordered where it is necessary to withstand pressure as in water and steam fittings; of Grade 2 for general purposes and of Grade 3, which are comparatively expensive to produce, for exceptionally high duty work. It is prescribed that ordinarily Grade 2 castings will be supplied except when castings of the other two grades are specifically required.

This standard has been prepared by the ISI's Basic Ferrous Metals Sectional Committee under the chairmanship of Shri J. S. Vatchagandhy of the Tata Iron & Steel Co. Ltd. The Committee includes nominees of Army's Technical Development Establishment, Roads Organization, (Ministry of Transport), Central Standards Office (Railways), Directorate General of Supplies and Disposals, Naval Headquarters, Indian Bureau of Mines, Ministry of National Resources and Scientific Research, as also representatives of Indian Engineering Association, Engineering Association of India, the Steel Re-Rolling Mills Association of India and other important manufacturing interests.

* * *

An Indian Standard Specification covering special qualities of steel sheets has just been issued by the Indian Standards Institution.

This standard covers the requirements for Panel Sheets, Deep-drawing Sheets, and Enamelling Quality Sheets, with and without draw.

Steel sheets are now in increasing demand for a number of purposes many of which cannot be adequately covered by the commercial quality material ordinarily manufactured. A need has, therefore, been felt for an Indian Standard specifically covering steel sheets for use in special applications and this Standard covers the requirements for the material required for panelling, ordinary deep drawing work and for enamelling purposes, with and without draw. It does not, however, cover the extra deep-drawing quality material as it is generally understood since capacity for the manufacture of this type of sheets does not exist in the country as yet. Provision has been made in this Standard for the supply of steel sheets in any of the four finishes, namely cold rolled, roller levelled, stretcher levelled and oiled. Galvanized finish has already been covered by another Indian Standard and a separate Indian Standard is under formulation for tin plates.

Steel sheets are used for a variety of purposes and special quality steel sheets are available in a number of types and finishes. The manufacturers are, therefore, at times not in a position to supply the right type of material for want of adequate information from the fabricators of sheet metal products. The purchaser can get the material best suited for his purpose by furnishing the manufacturer with the fullest possible information on the purpose for which the sheets are required. In this connection, and Appendix has been included in the Indian Standard giving the particulars which would generally be of assistance to the manufacturers in deciding the type and finish of material most suitable for a specific application.

This standard has been prepared by the ISI's Basic Ferrous Metals Sectional Committee under the Chairmanship of Shri J. S. Vatchagandhy of Tata Iron & Steel Co. Ltd. The Committee includes nominees of Army's Technical Development Establishment Roads Organization (Ministry of Transport) Central Standards Office (Railways), Directorate General of Supplies and Disposals, Naval Headquarters, Indian Bureau of Mines, as also representatives of Indian Engineering Association, Engineering Association of India, Indian Institute of Metals, the Steel Re-Rolling Mills Association of India, and other important manufacturing interests.

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STANDARD CODE FOR INSULATION AND OPERATION OF COLD STORAGES

The Indian Standards Institution has prepared and circulated for the purpose of eliciting comments a draft Standard Code for Insulation and Operation of Cold Storages.

Construction and operation of cold storages involves a number of problems among which are the economic running of the cold storage and the safety of the workers who would be moving in and out of the cold storage. At present the cold storage industry in this country is dependent upon technical data obtained from abroad and certain thumb rules for the construction and insulation of the cold storage. The operation of the cold storage industry is governed by provisions of the Factory Act to ensure the safety of the workmen.

The Refrigeration and Air-Conditioning Sectional Committee felt that a code of practice giving broadly the directions with regard to the construction, insulation and operation of cold storages would help the cold storage industry in following good practices and therefore has formulated this Code. The Code deals with terminology, insulation requirements, ventilation of the space below floor, of low temperature rooms and also the safety of workers in cold storage rooms and is one of a series of codes and standards being published by the same Committee to cover the refrigeration and air-conditioning fields comprehensively.

* * *

Standard Methods of Sampling Coal and Coke are contained in a standard just published by the Indian Standards Institution. For Coal this Indian Standard prescribes methods of sampling from coal seam in *situ*, normal consignments and large stacks; while for Coke, it prescribes the methods of sampling only from normal consignments.

The weight of gross sample to be drawn according to the size of the material and the weight and number of increments in which the sample is to be drawn are prescribed in the Standard. Also included is the method of reduction of gross sample from a bulk, which may be of the order of 1500 lbs., to the various individual samples for determination of moisture, ash fusion and other tests including laboratory analysis.

It is felt that further investigations on a statistical basis have to be carried out over a long period to achieve greater accuracy in the drawing of representative samples characteristic of Indian Coal and Coke. The Standard has, therefore, been classified as *tentative* and will be reviewed at the end of a 3-year period in the light of practical experience gained and the intensive investigations which are planned by the Fuel Research Institute, Jealgora.

* * *

A standard giving the methods of sampling and testing of refractory materials has been published by the Indian Standards Institution.

This standard is one of a series of Indian Standards for refractory materials and deals with the methods of sampling, chemical analysis and physical tests for fireclay and silica refractories and fireclay mortar. The general requirements for these items were laid down in standards published earlier by the ISI.

The methods for testing fireclay refractories were included first in the Indian Standards for the three

grades of fireclay refractories published in 1949 and revised last year. For convenience in handling, these test methods applying to fireclay refractories have now been published in a separate standard along with methods for testing silica refractories and fireclay mortar. As and when Indian Standards are issued for other types of refractory materials the additional methods of tests which might be necessary would be incorporated in this standard.

The Refractories Sectional Committee which was responsible for preparing this standard appreciated that as the service conditions varied from industry to industry, it would be necessary to conduct detailed surveys of these conditions before specific requirements to be met with by the refractories for different applications could be laid down. Such surveys, it was felt, would take a long time to be completed and therefore for the present it is emphasised in the standard that though a number of tests have been prescribed, yet all the tests need not be conducted in each case since by a judicious application of some of the tests it should be possible to assess the quality of the material in a given lot. However, the tests to be conducted in each case would depend upon the service conditions for which the material is intended.

To guide testing authorities and suppliers, the minimum size of sample and the minimum quantity of test material have been specified in the standard.

The general principles involved in the sampling of refractory materials and finished products are contained in an appendix to the standard.

The Refractories Sectional Committee which has prepared this standard includes refractory makers, users and testing organizations.

* * *

INDIAN STANDARD SPECIFICATION FOR DOMESTIC WATER METERS

The Indian Standards Institution has prepared for circulation and comments a draft Standard Specification for Domestic Water Meters.

Domestic Water Meters are used to measure supply of water to houses and factories and are mostly imported from U. K., U.S.A. and the continental countries. Only one factory in India manufactures half inch water meters.

The variety in design, performance and accuracy of imported water meters has caused difficulties for purchasing departments in evaluating comparatively the efficiency of these meters. ISI's standard has been prepared to help purchasing departments by indicating specific requirements for materials and construction of the meters as also by detailing their performance requirements. The standard covers meters for $\frac{1}{2}$ in., $\frac{3}{4}$ in., 1 in., $1\frac{1}{2}$ in. and 2 in., pipe lines.

Among performance requirements the Indian Standard specifies hydrostatic test, nominal capacity, continuous running capacity, metering accuracy at lower limit of flow and permissible error at continuous running capacity. It also specifies details of Type Tests and Acceptance Tests, among which is included a Life Test which requires the meter to operate continuously for a period of 60 days without showing any sign of deterioration at the end.

PUSH-BUTTON SHUNTING CUTS OVERHEAD COSTS

A revolutionary British automatic system of handling trains of wagons in marshalling yards has been developed which, it is claimed, reduces the cost of installation to one-third and makes running costs very much lower. The first installation of its kind in Britain — and, it is believed, in the world — was recently set up at the British Electricity Authority's power station at Leicester by the manufacturing company which designed it. A similar installation has been laid out at the National Coal Board's plant at Dalkeith, Scotland, for coal preparation.

Mr. F. G. Mitchell, chairman of the company, originally thought of the idea during the war, when he was grappling with the problem of handling wagons in the black-out. Since then, his company has developed the system to handle coal at 1,000 tons or more an hour — a rate of delivery needed by the big power stations now being planned, and virtually unattainable by the use of conventional man-handling methods. There is no limit to the size or capacity of this system, which can be designed for factories, steel works, mines, power stations, dockyards — in fact, anywhere there are marshalling yards or incoming trainloads of wagons.

Main advantages claimed for the new system are: it can cut by half the site area are required, thus reducing the cost of sidings and their maintenance, and reducing the length of track required; it eliminates man-handling, and can be operated 24 hours a day in all weathers; and it saves manpower.

THE GENESIS OF PERMANENT WAY

By H. C. Towers, M.I.E.E., M.I.R.S.E., M. Inst. T., Fellow P. Way Inst.

THE origin of the railway of today is to be found in the small ore truck or tub, running on wooden rails of about 2 ft. gauge, which miners in the Tyrol used as long ago as A. D. 1530. The earliest mention of a tramroad in England is contained in the will of Ambrose Middleton of Barnard Castle, dated August 5, 1555. It is probable that Huntingdon Beaumont of Coleorton, Leicestershire, introduced the use of rails and tracks to this country, and about A. D. 1598 accounts were rendered at Wollatton for coal and rails, showing that there must have been a wagon way there, almost certainly in connection with the conveyance of coal from the pits near Wollatton Hall to the River Trent. Beaumont, having become a lessee of Cowpen Colliery, Northemberland, in A. D. 1602, had a wooden wagon way built about 1618 between the colliery and the staiths on the River Blyth. Baulks of timber or " sleepers ", about 6 ft. in length by about 5 ins. deep and 5 ins. wide, were laid transversely about 2 ft. apart, and on these the rails or scantlings of oak, 6 ft. in length and about 4 ins. deep by about 5 ins. wide, were fastened by means of wooden trenails.

The next step was the use of flanged wooden wheels of which the earliest known trace is on the wooden wagon way built by Ralph Allen about 1733 at Prior Park, Bath, to

Permanent way gangmen working on track on Indian Railways.

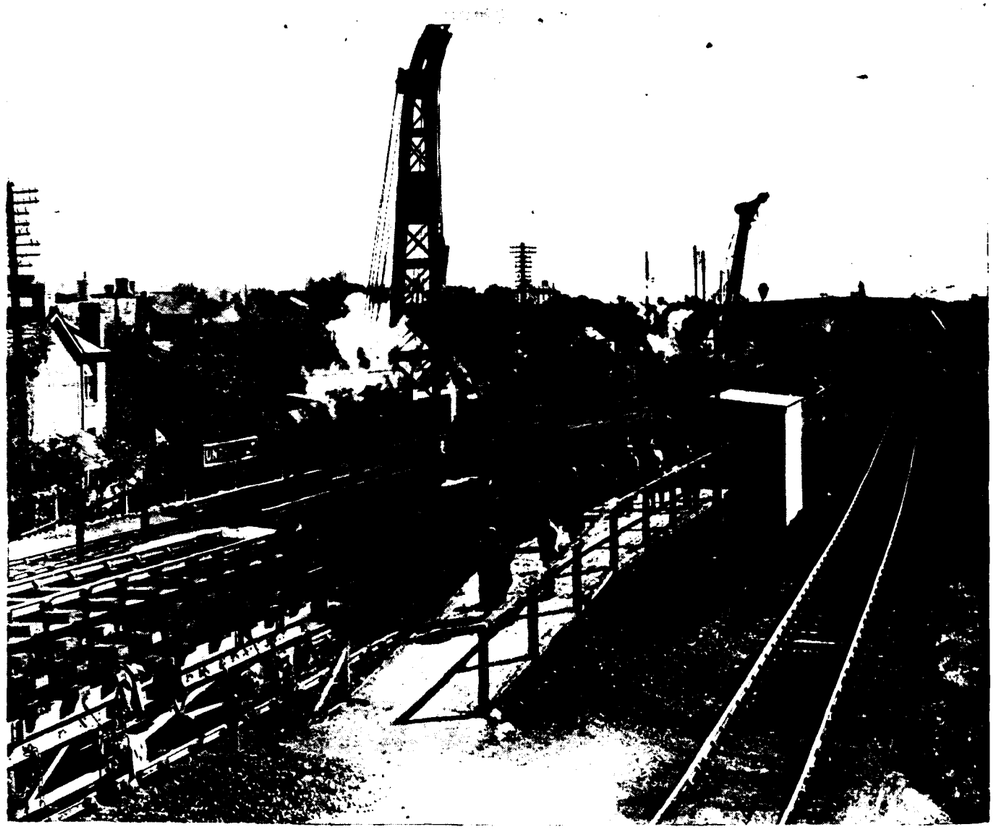
bring some stone from the quarries to the waterside. The use of the flange did not spread generally, but tramroads were adopted extensively in the Midlands, the North and the South Wales. The continued hard wear to which these early wooden ways were subjected, resulted in frequent breakages of the single rails, so that additional scantlings were secured to lower planks by wooden trenails.

The wagon wheels gradually indented and destroyed the timber and the next step, early in the eighteenth century, was that of laying iron plates over the upper surface of the timber. The business of keeping the wagons on the tracks was at first left to the dexterity of the horse drivers. The next development was on a tramroad, near the Nunnery Colliery, Sheffield, where iron angles were used over the timber baulks, instead of iron plates. These parallel angles were laid back to back with a distance of about five feet between them and the flat portions of the angles, on which the wagons ran, pointing outwards. The upturned portions kept the wagon wheels from straying off the track. They were, in effect, the first step towards gauge.

The earliest use of iron plates to strengthen the double rails appears to have been at Whitehaven Collieries, Cumberland, in 1738. These plates, probably of foreign origin, were about 2 in. wide and ½ in. thick, with flanges on the inside, and were spiked to the timber beneath. This improvement in the surface of the track had a marked effect on the economy of transport, one horse being able to draw about 45 cwt. of coal as compared with 18 cwt. on an ordinary road. In 1754 Abraham Darby, the proprietor of Coalbrookdale Ironworks in Shropshire, built additional furnaces at Horsehay and connected the two works by a wagon way

the plates of which were of wrought iron manufactured by a new process at Coalbrookdale. Similar plate rails, presumably of wrought iron, were made at Hunslet foundry, near Leeds, for Middleton Colliery in 1758. This wagon way ran from the colliery to the wharves at Kidacre and Great Wilson Street, Leeds, a distance of about 3½ miles. It was the first railway to receive the sanction of Parliament, and is also notable as having been relaid in 1812 with John Blenkinsop's rack rails, upon which Matthew Murray's steam locomotive ran from June 1812 onward, the first successful commercial use of the locomotive.

The Coalbrookdale plate way having been in continual use with very heavy traffic for about 12 years, the rails were found to be in a very dilapidated condition. The Works Manager, Mr. Richard Reynolds, therefore made experiments with cast-iron plate rails. These appeared to have answered the purpose so well that on November 13, 1767 had five or six tons of rail plates cast with which he reconstructed the wagon way between Coalbrookdale and Horsehay. These plates may be considered as transitional between the thin wrought-iron plates previously in use and the edge rail that superseded them.



Crane for laying prefabricated track. (British Railways)

The Coalbrookdale plates were cast in lengths of 5 ft., they were 4 in. wide, 1¼ in. thick, and flanged on the inside. Three holes were provided in the outer edge of each casting, by which they were fixed to the wooden track.

Cast-iron plate rails of a similar type were also adopted at the Duke of Norfolk's colliery (now the Nunnery Colliery) near Sheffield in 1776 by John Curr, but these had the flange on the outer edge. The rails were made locally, chiefly by Benjamin Outram, of Butterley. His partner, William Jessop, introduced in 1789 what was known as the edge rail, which, of course, needed a flange on the wagon wheel. The Loughborough and Nanpantan Railway, which was opened in June, 1789, was the first line to be laid with edge rails and also the first on which iron flanged wheels were used. For some years plates were the more popular as they were more easily made, and also because they did not require the use of special wagon wheels. Incidentally, a widespread myth has existed for many years that the word tramway was a corruption of "Outram-Way"; the word tram is very much older and was derived from the Scandinavian term for a log, Outram did give us one word, however, as he called his men platelayers!! It is interesting to recall that the title of platelayer, which was applied until recently to the men responsible for the laying and the maintenance of the tracks on British Railways, descended from those, who, in those pioneering days, were sent out to lay the promitive "plate ways".

This transfer, from the plateways, with their angle plates, to the rail and the flanged wheel, is the origin of the singular measurement of 4 ft. 8½ ins. which h

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Indian gangmen engaged in operation of track slewing.

become the standard gauge in Great Britain and so many other countries. In all probability the wagon wheels were about five feet apart and the upturned flanges of the angles were laid at something slightly less than this distance from one another. The change to flanged wheels transferred the measurement from the outside of the two angles or rails to the inside. The deduction of five feet of the width of the two heads of the diminutive rails in those early days brought the width of the track down to the uncomfortable figure of 4 ft. 8½ ins. which is now standard.

The first locomotives sent to America were of British origin so America standardised 4 ft. 8½ ins. as the gauge of her railways followed by Canada and the Continent of Europe. This explains why it is possible for famous British locomotives like "Cock o' the North" and others to run trials in those countries.

Railway gauges of the world vary from 5 ft. 6 ins. to 1 ft. 11½ ins. Brunel, at one time the Great Western Railway's famous engineer, originally constructed that line to 7 ft. gauge, the widest in the world. Other railways being constructed in the North of England were to standard gauge 4 ft. 8½ ins. On August 6th, 1845 the Gauge Commission, set up in Great Britain, decided that 4 ft. 8½ ins. should be the British Standard except for the Great Western Railway which was permitted to retain the 7 feet gauge. In due course the Great Western had, of necessity, to be converted in order to permit interchange of rolling stock, through running, etc. The last 7 ft. gauge train was withdrawn on May 20th, 1892 and the gauge conversion was completed on May 23rd. The subject of railway gauges, being largely one of economies, is too extensive to be dealt with here. Apparently standard gauge is the most economical and is the happy medium between broad gauge (5 ft. 6 ins.) and metre gauge (3 ft. 3⅜ ins.) in respect of loads, speed and cost of construction.

It is interesting to note that there are eighty railways in the world possessing the 3 ft. 6 ins. gauge. Ranging in size from the Snaefell five mile long mountain railway on the Isle of Man to South Africa's vast network of 12,466 miles. These eighty lines have an aggregate length of approximately 63,000 miles. They cover Australia, Tasmania, New Zealand, all parts of Africa, Sudan, Japan, East Indies, Sweden and Norway.

They operate in the icy mountains of Scandinavia, in the deserts, veldts and jungles of the African Continent; in the islands of the Caribbean and over the dusty plains

of Australia. They are in the Phillipine Islands and in Central and South America while even in the heart of "darkest Africa" may be found a 1500 mile Belgian owned railway with the forbidding title of Cie du Chemin de Fer du Bas-Congo au Kantanga.

Before the war, the Japanese Imperial Government Railway (11,229 miles) and the Netherlands Indian State Railways of Java (2,327 miles) were considered, together with South Africa and New Zealand, to be the finest 3 ft. 6 ins. gauge railways in the world—comparable with many railways using standard or broad gauge. At the present time the Japanese and Indonesian Railways are in a depreciated condition due to war damage leaving Australia and New Zealand well to the fore in the ranks of progressive medium gauge railways.

After the standard 4 ft. 8½ ins. gauge used in Great Britain, North America, Europe and elsewhere the most widely used gauge is the metre (3 ft. ⅜ ins.). Over 230 railways of the world use this gauge with an aggregate length of 75,000 miles. Brazil has 19,198 miles of metre gauge railway and India 14,416 miles.

Among the odd gauges are those of 3 ft. 5½ ins. to 1 ft. 3 ins. the latter being the narrowest used for public railways. Popular in sparcely settled countries are the 3 ft. and 2 ft. 6 ins. gauge lines totalling 5919 and 7212 miles respectively while Sweden has 1675 miles of steam and electrically operated railway laid to the odd gauge of 2 ft. 11 $\frac{1}{16}$th ins. Altogether medium and narrow gauge railways have an aggregate length of 157,000 miles or approximately 20% of the world's total mileage.

South Africa uses some of the largest and most powerful steam locomotives in the world while New Zealand sets an exceptionally high standard in locomotive design. Pre-war Japanese and Indonesian railways operated faster express trains than many European or American Railways and even in mountainous New Zealand, trains are fast considering the difficult topography and scattered population.

The world's record for the longest stretch of straight railway belongs to the Transcontinental Railway of the Commonwealth of Australia which is dead straight for 328 miles across the Nullabor plain. Next in order comes the Junin and Mackenna stretch on the Buenos Aires and Pacific Railway of Argentina which is a tangent for 205 miles.

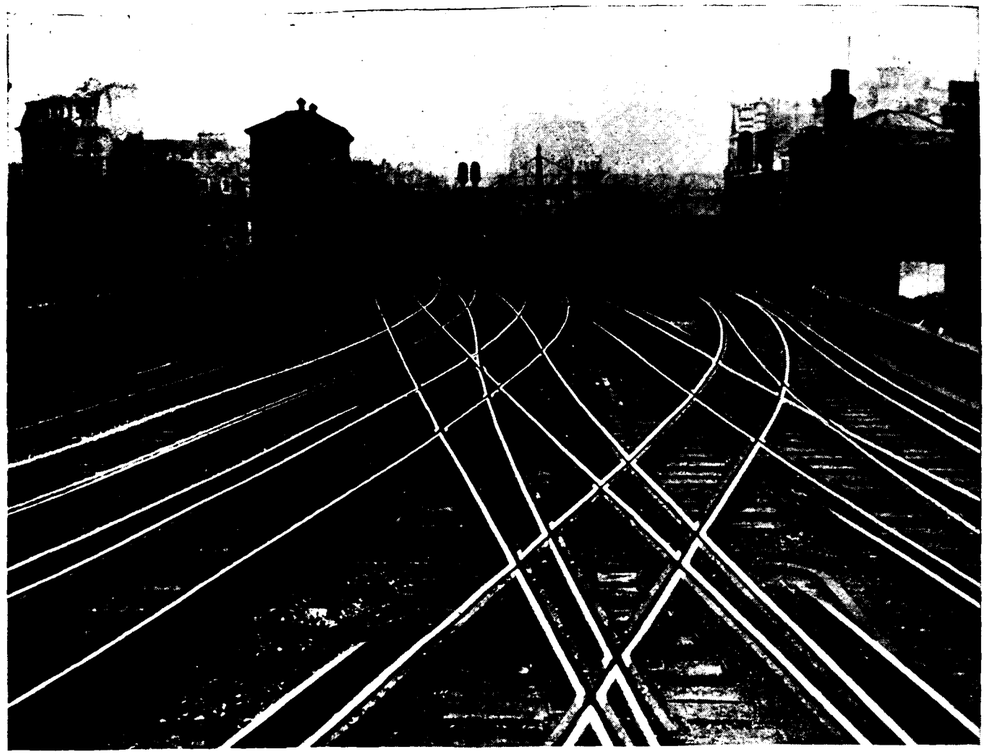
The first railway open to the public by payment of toll, and therefore, in one respect the father of the modern railway was the Surrey Iron Railway. This pioneer company, was incorporated on May 21, 1801, and opened between the Thames at Wandsworth and Croydon on July 26, 1803. The double track line was built by William Jessop and laid with Outram cast-iron tram plates on stone blocks. The plates, which were made at the Butterley Ironworks were in 3 ft. 2 in. lengths, 3½ in. wide on the tread and ¾ in. thick. They had elliptical flanges on the inside.

Various novelties were invented during the next few years, including Wyatt's hexagonal cast rail of 1802; Woodhouse's cast-iron channel rail of 1803; and Le Cann's dovetail-jointed tram rail of 1808. These however, did not directly affect the main trend of permanent way development. The next important improvement was made in 1816 when William Losh and George Stephenson patented an arrangement whereby the adjacent ends of two cast-iron rails were tapered, placed in a chair, and over-lapped for about 2¼ in. One pin then passed through both cheeks of the chair, and the two rail ends. The chair was fastened to a stone sleeper by a pin on each side, which was driven into wooden plugs inserted in the sleeper.

Wrought iron rails were used at Walbottle Colliery near Newcastle-on-Tyne, in 1805, and the Tindale Fell, Cumberland about 1807. The latter were 12 ft. long and 1½ in. square, but both these and Jessop's rails presented the same objection, namely, that they cut into the wagon tyres. Increase in width added to both weight and cost.

In 1820, John Birkinshaw, of the Bedlington Ironworks, designed a wrought-iron rail of T section, which not only had a larger head, but was lighter than cast-iron rails. Moreover, he rolled his rails into lengths of 15 ft., which was another important development. They were laid in chairs 3 ft. apart and secured by a tapered iron key. Many of these rails and supports are still in the ground. Birkinshaw also claimed to have originated the idea of welding rails into long lengths.

The old Jessop rail culminated in the standard flat bottomed rail as used extensively on the Continent, the United States and India. Although associated with the name of Vignoles, the flat-bottom rail was actually first developed by Robert Stevens, the engineer of the Camden & Amboy Railroad, New Jersey, in 1830; the first were rolled at the Dowlais works in South Wales. Similar rails were used on the Birmingham & Gloucester Railway in 1840. Stevens also invented the fishplate to join his rails, and this proved the most satisfactory method. The bullhead rail, now standard in Great



Borough Market Junction—Rolled Manganese Steel Crossings before renewal. (British Railways)

Britain is a development of the double,-headed reversible rail introduced in 1835 by Joseph Locke, who also used wooden keys. In its present form the bull-headed rail dates from 1858.

The Birkinshaw rails described above were used on the Stockton & Darlington Railway, and so provided the first path for public, locomotive-hauled trains. They weighed 28 lb. a yard and were supported on stone sleepers. The same type of track was laid for the Liverpool and Manchester railway, which was opened five years later. Originally the rails were in 15 ft. lengths weighing 35 lb. a yard. Oak sleepers were used for those portions of the line which were on embankments, amounting to a fourteen miles out of the total mileage of thirty-two. For the other eighteen miles the rails were carried on stone blocks, but these were subsequently removed. A little later, a 50 lb. rail was introduced and eventually the standard weight for the system rose to 75 lb. a yard. Before Joseph Locke introduced the bull-head section in 1835, as has already been recorded, the Liverpool & Manchester used what was known as the parallel rail, which was of equal depth throughout and dispensed with the elliptical shape of the Birkinshaw pattern.

Bull-headed rails became standard in Great Britain, secured to chairs by means of wooden keys. Flat bottomed rails did not appear until the Second World War when rail shortage brought imports from the U.S.A. This type of rail has found favour on British Railways and many miles of track are in course of conversion. 436 miles of flat bottomed track will have been laid by the end of 1949.

The rail joint may justly be termed the permanent way engineer's major "headache". Even the most perfectly maintained joint communicates knocks to the rolling stock and conditions of foundation etc. makes matters worse and presents difficult maintenance. With a view to totally eliminating the rail joint experiments were carried out with long lengths of rail welded together so that joints were only necessary every two or three hundred feet.

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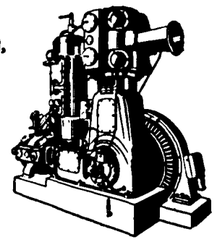

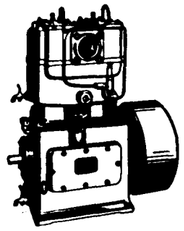

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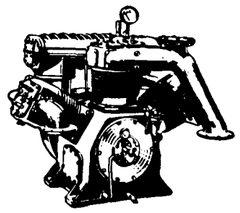

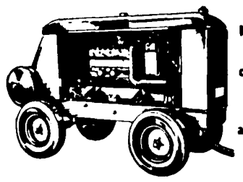

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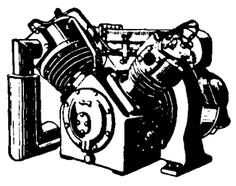

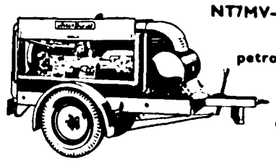

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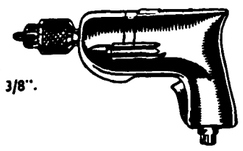

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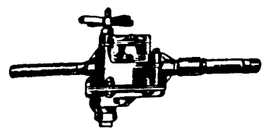

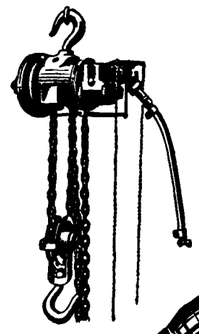

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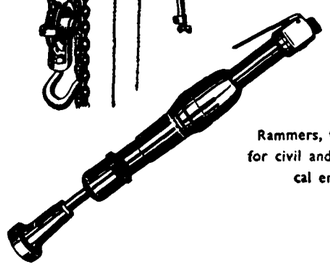

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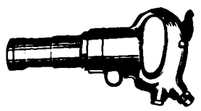

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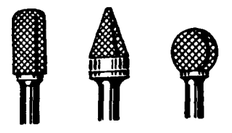

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The railways of London Transport have made great progress in this respect. Here, many of the tracks are laid in tunnels consisting of cast-iron segments which magnifies the slightest sound. It was therefore decided, just before the war, to adopt rails 300 feet long, welded in the workshops and transported to site by special train. Although some advance was made, the war stopped the experiment. The latest extensions of London Transport are now all laid with welded track with joints every 300 feet. A special track laying train is used consisting of two, 30 ton flat wagons for sleepers and 5 bogie bolster cars hauled by two battery operated locomotives.

The sleepers are laid first, already chaired. The rails are hoisted to special clips with pulleys at the top which run on a rail fixed to the roof of the tunnel. This enables the permanent way men to easily handle the rail, some 9500 lbs. in weight, to the position where it is to be laid.

In years gone by, the relaying of track was a formidable task. New sleepers had to be put down first, then chaired and finally the rails laid in. The rails had to be joined together by fishplates. On the London Transport Railways this work could only be done at night which limited the amount of track that could be relaid. On open sections of railways, the work has also to be done at night, on Sundays or during engineering possession of the line. The development of mobile lifting appliances has made the task of relaying much simpler. Like a child's model railway, the track is fabricated in the workshops and sent out on special wagons complete with sleepers, chairs and keys. This system, which speeds up track relaying work through the short non-traffic hours, is now perfected and in use on British Railways.

It has been truly stated that the humble sleeper is the foundation of railway transport. Passing from the early days of stone blocks, the wooden sleeper is used everywhere. During the last two decades attempts have been made at producing a more enduring sleeper than the wooden one. Steel trough and pot sleepers are in extensive use in India, the former gradually replacing the latter. Wooden sleepers still hold their own where track circuiting is in use.

George Stevenson was of the firm opinion that locomotive and track were part of each other and near perfection in each makes for smoother and quieter running higher speeds and greater comfort for passengers.

(By courtesy The Indian Railway Engineer)

RECONSTITUTED RAILWAY BOARD

WITH the passage of the years, the progressive increase of responsibilities of the Railway Board in the context of their widened control of activities and procedural matters on the various zonal units has led to greatly increased burdens on the Members and the Chairman. With a view to ensuring scientific planning and expeditious implementation of the various schemes which the railways have been called upon to undertake in the coming years, the Railway Board has now been enlarged from October 1, 1954 to include one more member. Announcing in Parliament last month the expansion in the Railway Board from four to five members, the Union Minister for Railways & Transport, Sri. Lal Bahadur Shastri stated that the changes now introduced from October 1, would enable the Railway Board to function even better than it has done, to keep in touch with the economic development in the country and to assess the needs and requirements of Transport in different regions. The Board would now be enabled, he said " To plan the development of railways with imagination and a wider perspective ".

The Railway Board will now have a Chairman, a Financial Commissioner and a member each for Transportation, Engineering and Staff. The tenure of office of the previous Chairman and members having since expired, when the Railway Board was reconstituted, Sri. G. Pande, General Manager and Chief Engineer of the Ganga Bridge Project was appointed as Chairman. Sri. K. P. Mushran, General Manager of the Western Railway was posted as Member, Staff; Sri. K. B. Mathur, General Manager, Northern Railway as Member, Transportation and Sri. P. C. Mukerjee, General Manager, Eastern Railway as Member, Engineering. Sri S. S. Vasist the outgoing Member, Transportation, Railway Board has, been appointed as Railway Adviser to the Ministry of Railways.

Sri. Pande joined the East Indian Railway in 1925 after passing out of the Thompson College of Civil Engineering, Roorkee, where he stood first and created a new record. Sri. Pande worked as Assistant Engineer till 1932 when he was posted to the Personnel Branch. He reverted back to the open line two years later and during the war years had worked in various posts on construction, the open line and in Personnel Branch.

In 1946 Sri. Pande was promoted as Deputy General Manager (Planning) and in the following year was appointed Joint Director, Civil Engineering, Railway Board. After officiating as Director, Civil Engineering, Railway Board, he returned to the East Indian Railway and served as Divisional Superintendent, Dinapur. He was subsequently placed in charge of construction of a new bridge across the Ganga River at Mokameh but

Shri G. Pande, Chairman of the reconstituted Railway Board.

was soon recalled to the Railway Board in 1948 as Director, Civil Engineering. Sri. Pande took over as General Manager of the O. T. Railway in October, 1950 and assumed charge as General Manager of the integrated North Eastern Railway on April 14, 1952. He relinquished this charge on Angust 28, 1953 to take over the post of General Manager and Chief Engineer of the major and vital Rs. 16-crore Ganga Bridge Project where he had already done much of the preliminary ground work.

Sri. Pande has an extremely wide and varied experience of the various branches of railway administration and organisation which is now at the disposal of

(Continued on page 22)

MOVING MELA TRAFFIC

By A. H. Pearson

MELAS and fairs both large and small are almost of daily occurrence if one takes the entire sub-continent of India as a whole. Depending upon the type, significance and locality of each mela, hundreds and thousands of people converge at the place where the mela is being held, perhaps on a pilgrimage to some shrine, temple, holy place, or even for trading purposes.

As far as a railway Administration is concerned, where a mela or fair is of purely local significance and is not likely to draw more than a few extra hundreds, or even a couple of thousand people, a few special arrangements is all that is required to handle the sudden local upsurge of traffic. But there are melas held in India which are of nation-wide importance, and to the place where such a mela or religious festival is being held, the people come pouring in by almost all available means of transport in their hundreds of thousands. It is usually the railways which must carry almost 99 per cent of such mela traffic, and obviously this sudden seasonal rush can only be smoothly moved by special arrangements. Let us see how a railway Administration tackles such a problem.

A mela or religious festival of nation-wide interest is due to be held on a certain day or days in the year. At least two or three months in advance the railway Administration in consultation with the local State civil and police officials go into action. A meeting is held, usually at or very near the place where the mela is to take place, at which highranking railway, civil and police officers get together to formulate arrangements to handle the enormous influx of people who are expected at attend the mela. The State civil authorities have estimated that perhaps from one hundred to two hundred thousand people are likely to visit the mela. Now what is considered to be perhaps the most important aspect of handling mela traffic of large magnitude? The answer is

(Continued from page 21)

our country. In the years that lie ahead Sri. Pande will steer the railways through to the end of the first Five Year Plan, whose immense benefits we are already beginning to reap, and will start us off on the second Five Year Plan the foundation for which is now being laid.

Sri. K. B. Mathur who has assumed charge of the office of Member, Transportation of the Railway Board joined the East Indian Railway in 1928 and worked in various capacities in the Transportation and Commercial Departments of that Railway. In 1942 his services were loaned to the Defence Department as Miltraff to control rail movements in the vital Eastern Army Zone. In 1946 he was promoted to the Junior Administrative grade and in 1947 he was deputed as a delegate to the International Railway Congress at Lucerene. In 1948 Sri. Mathur was appointed as the Chief Operating Superintendent, East Indian Railway and three years later he became its General Manager.

Sri. K. P. Mushran who has taken over charge as Member, Staff, of the Railway Board joined the Indian Railway Service of Engineers in 1925 when he was posted to the Northern Railway. He held various posts on that Railway on the open line, on construction and as an Establishment Officer. Before partition, Sri. Mushran was appointed as a Divisional Superintendent at Delhi and later as Deputy General Manager, Lahore and Deputy Chief Engineer on Special Duty. He was deputed to represent India as a member of the delegation to the International Railway Congress at Lucerene (Switzerland) in 1947. On his return he was appointed as Director, Establishment, Railway Board & in 1949 was promoted as General Manager, Bombay, Baroda & Central India Railway where he continued as General Manager of the Western Railway.

Sri. P. C. Mukerjee the new Member for Engineering, Railway Board who was educated at Hastings House at Calcutta and the Clare College, Cambridge started his career in the Engineering Department of the old East Indian Railway where he held a number of different posts both on construction and on the open line. He was also an Employment Officer of the Workshops and Personnel Officer. During the war he was with the Department of Munitions Production where he worked as Deputy Director and Director, Civil Engineering and finally as Deputy Director General (Engineering). In 1947 Sri. Mukerjee returned to his own Railway, the East Indian, as the Deputy General Manager 'Works' and a year later took charge as General Manager of the old B. N. Railway. In 1949 he was posted as General Manager of the Locomotive Work at Chittaranjan & was transferred as General Manager of the Eastern Railway five years later.

health, sanitation and hygiene. The Railway station into which this large number of people will come for the mela, has been designed and built to handle one-tenth of such traffic. The passengers pouring in are coming from all parts of the country, and many of them will be on the station premises and waiting halls for hour perhaps.

During their brief sojourn in railway station premises these passengers in their thousands will have fouled latrines and floors; and if this refuse, litter and filth are allowed to accumulate, it would not be long before the scourge of cholera attacked in epidemic form. Elaborate arrangements are therefore made for cleaning of latrines, platforms, waiting halls, &c., by extra conservancy staff under the supervision of Sanitary Inspectors or supervisors.

As a prophylactic measure temporary anti-cholera inoculation centres are set up at the station where incoming passengers are promptly given an inoculation, if they have not already been given one for which they must produce the necessary certificate. The Public Relations Officers of both the Railways and State Governments concerned are required to give adequate and well-advanced publicity to these precautionary health measures.

Next we can consider the train arrangements. The normal passenger train services to and from the place of the festival are designed to carry a certain all-the-year round estimated traffic. When the railway is suddenly required to convey over a particular section of its system traffic ten times as large, and all concentrated within a few days, arrangements are made to run additional passenger trains—known commonly as "mela special" for a certain period prior to the day of the mela or festival and again subsequent to it.

With the object of attracting extra revenue during a mela period railway administrations usually offer certain fare concessions at one and a half single journey fare for a double journey. Special arrangements are also required to be made for the sale of tickets from the booking offices at the mela station and stations from which perhaps a larger number of passengers than usual will come. For this purpose additional booking clerks are placed on duty, or extra booking windows opened. At stations where the sale of tickets is done at certain periods only, this is extended to a twenty-four hour sale of tickets, when a passenger can come to the station at any hour of the day or night and be sure of getting his ticket.

Whenever there are large crowds of men and women gathered together, there is always the predatory species eagerly awaiting a chance to earn a little extra by way of fraud and dishonesty. To these melas and fairs come thousands of simple-hearted villagers, who are bewildered at what they see. Obviously, neither the railway nor the police authorities can afford 'protection' to these simple people and guard them against the cunning and craft of the sharpers, but the railway provide extra passenger guides whose job it is to find those without guile and steer them far and away from those who use their guile to dupe their fellow-men. Large numbers of extra police as well as railway Watch and Ward staff are also posted to deter the dishonest opportunist from indulgence in crime, and to keep general law and order.

When a man goes on a pilgrimage or to enjoy a spectacle, he and his party must at some time feel hungry, and it is during these high days and heydays that one has a better appetite for something beyond ordinary food. At the railway station the normal refreshment rooms and stalls are not equipped to deal with such an enormous demand as a result of thousands of extra passengers coming in. To cope with this situation the railway authorities in consultation with the catering and vending contractors make arrangements for the provision of extra foodstalls and extra foodstuffs. Here too, the aid of the State Governments must be sought, so that extra stocks of the foodstuffs usually demanded by passengers will be available when the rush is in full swing.

It may happen also that the normal water suppiy at the railway station will not be enough to meet the demands of the extra thousands for drinking and washing purposes. If the source from which the railway obtains its water supply has reserves from which the extra water can be drawn, then the railway authorities will provide for all that will be required; but if the railway water supply cannot meet the situation, then the local civil authorities must come to the aid of the railway for whatever is needed.

Shelter for passengers is another factor that must be watched. The existing waiting halls or passenger sheds were built for the normal passenger traffic of that particular station. The railway engineers will then get busy and erect additional passenger sheds or shelters for the large number of passengers that will come in for the mela.

Well ahead of the actual holding of the mela or fair at a station every additional facility needed to handle the rush of extra traffic has been made ready by the railway and civil authorities so that the inward and outward flow of passengers can go on smoothly and efficiently.

For the thousands of people who intend visiting a mela or the place of some great religious festival, their objective is to get there and be an eye-witness and participator in the great even, but long before they even get into a train, the railway staff are busy getting everything ready in the way of medical facilities, extra trains, food, water, shelters, enquiry office, telephones and other necessities, so that they will make the trip with the least amount of discomfort.

SERVICE ABOVE SELF

Man owes three kinds of service, namely, (i) service to self and family, (2) service to society and the country and (3) service to God the creator of the universe.

Service to self enjoins upon him to be healthy in body and mind and give comforts of life to his near and dear; earn his livelihood by honest means; and bring up his children to be good citizens.

Service to society and the country demands a higher order of conduct. He must think in terms of the larger interests of his countrymen and direct his thoughts and actions accordingly. He must engage himself in social activities for the upliftment of his race. He must remember that his actions will be judged by the results achieved in the common endeavour.

Love of country, i. e., patriotism, has its due place in this scheme of things. And so he must take an intelligent interest in the governance of the country, its problems, its headaches and what not. He must help marshalling the resources of the country to increased production. In short, he must actively participate in all schemes that are intended to promote happiness of his countrymen.

Service to God in the sublimest. It does not mean that you should leave the mundane world and retire into the forest and spend your days in deep meditation; it does not call for the dosowning of everything materialistic; and it does not prevent you from eaking the best out of life and its enjoyment.

What it does mean is that you should devote at least a few moments every day to the thought of your creator who in his infinite mercy made it possible for you to lead an honourable life, and utilise your intellectual faculties in the larger interests of humanity. In the midst of all the confusion and turmoil, stress and strain, the mad race for catching with speed and minting of money, all that you should remember is His omniscience and omnipotence.

In this three-fold aspect of service, one has to get rid of the eternal ego in him. Think of the mountains and rivers, of the flora and fauna, of the hills and dales, of the tigers and elephants, of the cobra and the forest, of the antelope and the deer, of the beasts and birds, of the stars and the myriads of other illuminating objects in the sky, of the sun and the rain they all vie with one another in complete unison to produce human happiness.

We the railwaymen are particularly engaged in promoting that universal happiness by dint of our hard work, and so, let us dedicate ourselves to the eternal service of the common good of all. That is the fundamental conception of service above self that we have to grapple with hoops of steel.

N. G. IYER

"You better hand over my husband's pay—there's very little left of it when he gets it".

IN YOUR OWN INTERESTS

HOW TO PURCHASE TICKETS

Buy your tickets only at the proper place. The authorised offices are (i) the Booking offices at the railway stations, (ii) the Town or City Booking Offices, (iii) the out-Agencies, (iv) Travel Agents. Never buy tickets from any other source as that may lead you to trouble. Please note that tickets are not transferable.

Buy your tickets in the proper time. You can avoid unnecessary excitement and trouble if you come to the station in good time, that is at least half an hour before the scheduled departure of your train. The Time Tables of the Railway are on sale at Booking Offices and Bookstalls.

Buy your tickets in the proper manner. Queue up at the Booking Window and you can get your ticket easier and quicker than by crowding at the counter.

By handing in the *exact fare in good coins or currency* you get the ticket easier and quicker, and save for yourself and the Booking Clerk time and trouble.

Check up your ticket and money before leaving the counter and draw the attention of the Booking Clerk to any discrepancy you may notice.

(Inserted in the interests of Travelling Public)

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