Public Works (1897) Department.

3.

G.O., No. 340 R

DATED 13 Mar 97

[Despatch Abstract.]

M^r R. A. Bell Ass^te Locomotive Supd^t S.I. Railway: Letter to the Govt of India forwarding an extract letter from the Board of Directors approving, subject to Govt sanction P 1/5^th of the Salary of — being granted to that officer as deputation allowance from 19th October to 20th December 96.

[P.W. 20. 5,000—80-11-96.]

Indexed. 18/5/97

BACK PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.
	49	R	23.1.97				

FURTHER PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

Public Works (1897) Department.

CURRENT No. 2135

Order No: 800 & 3: March/97.

From The Govt of India P.W.D.

Copy forwarded & necessary action & for information, as per reference to his letter No 48 & 16.1.97

No. 454 Co.

Dated 19th February 1897

Received 26.2.97

Enclosures

Spare copies

SUBJECT.

Deputation allowance to Mr Bell asst Loco: Supdt South Indian Railway

—

Stating that Board's sanction to the proposed grant of a — on the occasion of his visit to the various Loco: Workshops in India is awaited before considering the proposal

BACK PAPERS.

G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No.	Department.	Date.

All communications should be addressed to the Secretary.

No. 454 *G.*

GOVERNMENT OF INDIA.

PUBLIC WORKS DEPARTMENT.

GENERAL.

To

The Joint Secretary to the Government of Madras,

Public Works Department, Railway Branch.

Calcutta, the 19th February 1897.

Sir,

With reference to your letter No.49 R., dated 23rd January 1897, on the subject of the proposed grant of a deputation allowance of $\frac{1}{5}$th of salary to Mr.R.A.Bell, Assistant Locomotive Superintendent South Indian Railway, on the occasion of his visit to the various Locomotive Workshops in India, I am directed to state that the Government of India, will await the sanction of the Board of Directors before considering the proposal.

I have the honour to be,

Sir,

Your most obedient servant,

G H Walker

Under Secy. to the Govt. of India.

Documents accompanying:-

Nil.

S.A.

No. 471

South Indian Railway Co., Ld.

AGENT'S OFFICE,

Trichinopoly, 30th April 1897.

From

THE AGENT,
SOUTH INDIAN RAILWAY,

To

THE CONSULTING ENGINEER
FOR RAILWAYS,
MADRAS.

Sir,

Deputation of Assistant Loco: Superintendent Mr. R. A. Bell to visit various Locomotive and Carriage Workshops in India

With reference to your endorsement No. 800 of 3rd March 1897 on letter No. 4574 of the Government of India dated 19th February 1897 I have the honor to forward an extract from a letter from this Company's Managing Director and shall be glad if the deputation allowance of 1/5th of Mr. R. A. Bell's salary from 19th October to 20th December 1896 amounting to ~~Rs~~ 189 may now be sanctioned. The travelling allowance of ~~Rs~~ 4/- per diem has already been disbursed to this officer.

I have the honor to be
Sir
Your most obedient Servant
A.D.G. Sheen.
Capt. R.E.
Agent

1 Enclosure.

Communicate

G. Rly 1960
Vol. 3/5/97

Sanctd in No 1962 dy 11.6.97

From

The Agent,

South Indian Railway,

Trichinopoly.

To

The Consulting Engineer for

Railways,

Madras.

Dated

Received } 189

No.

Enclosure.

South Indian Railway.

(K. K.)
5

Extract from the Managing Director's Letter No. 88, dated London,

the 9th April 1897.

Subject.

Deputation of Assistant Locomotive Superintendent,

Mr:R.A.Bell-

Extract:— The Board have received the advice of your action in deputing Mr:Bell to visit the various Locomotive and Carriage Shops in India, with a view to his reporting on the working in force in each. This appears to have been done without first obtaining the sanction of the Government, a course which should have been followed. The Board will have no objection to the payment to Mr:Bell of the proposed deputation allowance of 1/5th of his salary from 9th October to 20th December 1896- provided the Government consent,- in addition to the travelling allowance of Rs:4 per diem to which an officer drawing Mr:Bell's rate of salary is entitled under the Company's regulations.

AGENT'S OFFICE,
TRICHINOPOLY,
29 April 1897.

(True Extract)

Chief Clerk, Agent's Office.

Accompaniment to the Agent's letter No. 471/87
of 30-4- 1897.

Communicate

Extract from a letter from the Agent, South Indian Railway, to the Board of Directors, N° 524, dated 10th March 1897.

× × × × ×

Deputation of Assistant Locomotive and Carriage Superintendent. Mr. R.A. Bell.

In October, 1896, I deputed this officer to visit the various Locomotive and Carriage and Wagon Workshops in India, and to furnish me with a report on their working in force in each as well as the method of accounting, and the accommodation provided.

Mr. Bell was absent from the 19th of October to the 20th of December 1896, and his report, which he is engaged in drawing up, will, I hope, be a valuable one and guide in the future working of the Locomotive and Carriage shops of this Railway.

On applying to Government for sanction to the disbursement to Mr. Bell of the deputation allowance of 1/15th of his salary permissible under the C.S.R. I have been informed that the Govt. of India await the sanction of the Board of Directors before considering the matter. As Mr. Bell's duties required a constant change of stations, will you please obtain and

Communicate

Communicate the sanction of the Directors to the grant of the allowance of Rs 4 per diem allowed to an officer of Mr Bell's rank.

Form No. 21.
500—7-1-97.

Office of the Consulting Engineer for Railways,

Madras, 3rd May 1897.

EXAMINER, Regr. No. 276 4 - MAY. 1897 Enclosures..... RAILWAY ACCOUNTS, MADRAS.

No. 1546.

OFFICE NOTE.

Letter from the Agent, South Indian Railway, No. 471 dated 30th April 1897, forwarded to the Examiner of Railway Accounts for remarks.

for E. R.

EXAMINER'S REPLY.

The Govt: of India should be informed, with reference to their letter No 4546 dated 19th February last, that the Board have approved, subject to Govt: sanction, of 1/5 of salary being granted to Mr Bell as deputation allowance from 19th October to 20th December 1896.

C. R. 5/5/97.

6.5.

R Form No. 12.

No. 340. R

Government of Madras.

PUBLIC WORKS DEPARTMENT,

RAILWAY BRANCH.

To

The Secy. to the Govt. of India,

P. W. Department.

Simla

Octacamund the 13th May 1897.

Sir,

With reference to your letter No. 454 G. dy the 19.2.97, I am directed to forward herewith an extract in which the Board of Directors [illegible] subject to Government sanction of 1/5 of his salary being granted to Mr Bell as deputation allowance from the 19th October to the 20th December 1896.

I have the honor to be
Sir
Your most obedient servant
Extract refd to.

Documents accdg

13/5/97

Bf.

No. 340. R. dated 13.5.97.

Public Works (1897) Department.

CURRENT No. 5596

4

Order

No 1962 d/11/6/97.

Copy forwarded for A with reference to correspondence ending with his letter No. 471 d/30.4.97

Copy to CR. CMH. 10/6

From Govt of India

No. 1432 G

Dated 28th May 1897

Received 9.6.97

Enclosures

Spare copies

Despatched on 11-6-97

SR MH 10.6

SUBJECT.

Deputation allowance to Mr R A Bell. Communicating sanction to the grant of a ——— asst Loco. Superintendent, S.I.R. from 19th Oct to 20th Dec 96.

O/L 203 of 39

10/6/97

BACK PAPERS.

G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No.	Department.	Date.

All communications should be addressed to the Secretary.

No. 1432 *G.*

GOVERNMENT OF INDIA.

PUBLIC WORKS DEPARTMENT.

GENERAL.

To

The Joint Secretary to the Government of Madras,

Public Works Department, Railway Branch.

Simla, the 28th May 1897.

Sir,

With reference to correspondence ending with your letter No.340 R. dated 13th May 1897, I am directed to communicate the sanction of the Government of India, to the grant of a deputation allowance at the rate of $\frac{1}{8}$th of salary to Mr. R.A. Bell, Assistant Locomotive Superintendent, South Indian Railway from the 19th October to 20th December 1896, during which he was deputed to the various Locomotive and Carriage Shops in India for the purpose of reporting on the working in force in each.

2. It is noted that the grant of this allowance has been approved by the Board in their letter No.88 dated 9th April 1897.

I have the honour to be,

Sir,

Your most obedient servant.

G H Walker

Under Secy. to the Govt. of India.

Documents accompanying.

Nil.

K.P.G.

No. 756

South Indian Railway Co., Ld.

AGENT'S OFFICE,

Trichinopoly, 22nd. July 1897.

From

THE AGENT,
SOUTH INDIAN RAILWAY,

To

THE CONSULTING ENGINEER
FOR RAILWAYS,
MADRAS.

Sir,

Flag A

Referring to correspondence ending with — your endorsement No. 1962 dated 11th June 1897 regarding the deputation of Assistant Loco: Superintendent Mr. R. A. Bell, to inspect the various — Locomotive and Carriage and Wagon Workshops in India for the purpose of reporting on the system of working in force in each, I have the honor to forward herewith three printed copies of the — Report submitted by this Officer.

I have the honor to be,
Sir,
Your most obedient Servant,
R.B.G. Shelley.
Captain, R.E.,
Agent.

3 Enclosures by Railway parcel.

Done. Put up in reports copy for my file

From

THE AGENT,

SOUTH INDIAN RAILWAY,

Trichinopoly.

To

THE CONSULTING ENGINEER FOR

RAILWAYS,

Madras.

Dated } 189

Received }

No.

ENCLOSURE.

C. No. 3209
Read. 24/7/97

REPORT.

—o—

In accordance with the instructions conveyed in the Agent's letter, No. 1451, the undermentioned Railway Companys' works were visited :—

Bombay, Baroda, and Central India. Broad gauge, at Parel.
Great Indian Peninsular. Broad gauge, at Parel.
Rajputana-Malwa. Metre gauge, Locomotive Shops, at Ajmere.
Rajputana-Malwa. Metre gauge, Carriage and Wagon Shops, at Ajmere.
Indian Midland. Broad gauge, at Jhansi.
Oudh and Rohilkund. Broad gauge, at Lucknow.
Bengal and North-Western. Metre gauge, at Sonepore, and Samastipur.
East Indian. Broad gauge, Locomotive Shops, at Jamalpur.
East Indian. Broad gauge, Carriage and Wagon Shops, at Howrah.
Eastern Bengal. Broad gauge, at Kanchrapara.
Eastern Bengal. Metre gauge, at Saidpur.
Bengal-Nagpur. Broad gauge, at Nagpur.
Southern Mahratta. Metre gauge, at Hubli.

The above are mentioned in the order of my visiting them; for convenience of comparison in the first two questions raised by the Agent, I have grouped the broad gauge lines together, and the metre gauge lines together.

The following were the questions raised in the Agent's letter :—

A. The extent of accommodation given in the different shops, in terms of some convenient unit of the work done in them ?

B. The proportionate number of units so provided for, in relation to the total number of units on the Railway ?

C. The system in force for supplying stores to the Locomotive Workshops ? Information being given as to whether Locomotive Stores are maintained separately from the General Stores, also whether the Locomotive Superintendent is allowed to purchase or if he has to draw from the General Stores ?

D. Whether, when stores are specially obtained for a large work, they are charged off to the work order at once, or whether they are drawn from the General, or Locomotive Stores as the case may be ?

E. Whether any system is in force of pricing serviceable returned stores, such as wheels and axles ?

F. Whether fuel is in charge of the Locomotive, or General Stores Department, and the rules in force?

G. Whether work order ledgers are posted daily, both as regards cash and stores ? If not, what system is adopted to enable Locomotive Superintendents to know and control their expenditure ?

H. Whether Locomotive Superintendents keep their own workshop accounts ?

I. What allowance per engine is approved for running and consumable stores at out depôts ?

J. To what articles the stores kept at out depôts are limited ?

K. The establishment allowed at out depôts per engine located, irrespective of the Locomotive Foreman's Office and Stores staff ?

L. The establishment allowed to a Locomotive Foreman for his Office and Local Stores ?

M. The number of depôts per mile of open line ?

N. Whether the State Railway system of workshop accounts is in force ?

In addition to the above, I enquired into the following matters :—

1. The general principles under which the General Stores accounts are kept including the pricing, and distribution of stores.

2. The system under which Drivers, and Firemen are paid.

3. As to whether fuel, and oil premia are paid, and the rules therefor, also the methods of preparing consumption sheets ?

4. The rules under which Load tables are prepared.

5. The forms in which the registers of wheel, and axle mileage are maintained.

6. The rules and methods for testing wheels and axles.

7. The methods of testing springs.

8. The system of train lighting in use.

9. The rules issued for cleaning carriages.

10. The rules for the periodical examination of vehicles.

11. The extent to which repairs are executed at out-stations.

12. Whether old brass is used over again, and any special mixtures in use for bearings ?

13. Whether white metal is used to any extent ?

14. Whether piece work is done in the workshops ?

15. The Subordinate supervising staff allowed for the workshops.

16. The outturn of metre gauge wheel lathes.

17. The general principles under which the Locomotive, Carriage, and Wagon Workshop, and Departmental accounts are kept, and prepared for submission, and the forms in use.

Various other matters were noticed, and mention of them is made in the latter part of this report.

Before going further, I will remark that I have throughout adopted the nomenclature in use on the South Indian Railway as far as Departments and Heads of Departments are concerned. The term General Stores will in some cases not be strictly correct, as the workshops on some lines are supplied from Branch Stores, or Depôt Stores, but the term will be used as signifying a place where stores under capital suspense account are kept under the charge of the Head of the Stores Department, whatever his official title may be.

In the same way Agent, and Chief Auditor will mean the officers occupying similar posts to those officers on the South Indian Railway, although on some lines they are called Manager, or Examiner.

The first two questions are most conveniently dealt with, by giving the answers in tabular form ; it is almost impossible to give the answers conveniently in any other. The others are dealt with at length, and a table giving the answers in brief for each line has also been prepared, and is herewith submitted.

A. & B. The answers to these questions embrace a very large amount of information, which took some time to collect, for the purpose of obtaining this I prepared a list of questions, and had this printed. A copy of it is attached to this report, *vide* Appendix A.

The answers were in some cases much fuller than in others. Copies of the answers received are also submitted, *vide* Appendix B.

The whole matter I have worked out in tabular form as being the most convenient.

Some of the works are divided up into more shops than others, in these cases I have grouped the figures. The Rajputana-Malwa Railway Locomotive Workshops have a separate Spring shop, I have grouped this with the Smith's shop, so as to make the different works outturns more directly comparable. Several other similar cases have been similarly dealt with. In other cases the figures have had to be more or less split up, owing to the fact that two different classes of work are done in the same shop, such as carriage and wagon repairs ; engine and carriage painting, &c. &c.

C. In the following workshops :—

Bombay, Baroda, and Central India,
Great Indian Peninsular,
Rajputana-Malwa, Carriage and Wagon Department,
Oudh and Rohilkund,
East Indian, Locomotive Department,
East Indian, Carriage and Wagon Department,
Bengal-Nagpur.

All stores are drawn from the General Stores as required ; that is to say, the Locomotive, or Carriage and Wagon Superintendent has no stores in his charge that have not been charged off.

In the undermentioned shops :—

Rajputana-Malwa, Locomotive Department,
Bengal and North-Western,
Eastern Bengal, Broad Gauge,
Eastern Bengal, Metre Gauge,

departmental stores are kept under capital suspense account in charge of the Locomotive Superintendent, comprising everything required for the working of the shops and maintenance of the stock.

The Southern Mahratta Workshops have a small stock of such articles as are constantly being drawn, in small quantities, in the Locomotive stores ; but large quantities are always drawn from the General Stores.

The Indian Midland Workshops draw everything that they are likely to require from the General Stores for one month, on the first of that month. These stores are held under imprest, and are distributed among the shops requiring them, to be accounted for as used.

The Superintendents of the :—
Bombay, Baroda, and Central India,
East Indian, Carriage and Wagon Department,
Bengal and North-Western,

have the power to purchase in the open market, the latter to the extent of Rs. 200, but this power is very seldom exercised, and then generally for very small amounts.

The Locomotive Superintendent of the Indian Midland had at the time of my visit no power to purchase, but it was under contemplation, I was told, to give the Heads of Departments power to purchase up to Rs. 200.

On the :—
Great Indian Peninsular,
Rajputana-Malwa,
Oudh and Rohilkund,
Eastern Bengal,
Bengal-Nagpur,
Southern Mahratta,

none of the Superintendents have the power to purchase anything, without previous sanction from the Agent. Everything required is obtained from the General Stores primarily, although in some cases it is kept in Departmental Stores until actually required for use.

D. In the case of stores being specially obtained for a large work, they are kept in the General Stores, or in the Departmental Stores, under capital suspense account, and drawn, and charged off as required; on the following lines :—

Bombay, Baroda, and Central India,
Great Indian Peninsular,
Rajputana-Malwa,
Oudh and Rohilkund,
Bengal and North-Western,
East Indian,
Eastern Bengal.

The Locomotive Superintendent of the Great Indian Peninsular Railway informed me that three engines, out of four that were expected to arrive shortly after my visit, would be kept in the General Stores, as he only required one of them to complete his estimate for renewals during the current half-year.

On the following Railways :—
Indian Midland,
Southern Mahratta,

these stores are taken over on receipt, in both cases being written off at once.

The general practice is to keep stores under capital suspense account as long as possible, up to the time of their being actually required.

E. This question resolves itself into two parts, the first dealing with (i) serviceable returned stores that are in constant use, such as, injectors, engine axle boxes, wheels and

axles, &c., the second with (ii) stores that will be required again, but not for a considerable time, such as, an excessive stock of spare parts of rolling stock, spare boilers, &c.

This latter part is again divisible into (*a*) stores that are practically always serviceable, such as spare parts of standard classes of engines, and (*b*) stores that are serviceable when returned, but may become obsolete owing to the introduction of improved methods, such as oil roof lamps returned to Stores as serviceable, but which may become obsolete through the introduction of gas lighting.

The practice in this matter varies very widely on the different Railways.

Dealing with class (i), on the following lines no attempt is made to price these :—
Bombay, Baroda, and Central India,
Great Indian Peninsular,
Oudh and Rohilkund,
Bengal and North-Western,
East Indian, Locomotive Department,

nor are they strictly speaking returned to Stores, although the two last mentioned keep them, the former in the Locomotive Stores, the latter in the General Stores; this is, however, only for safe custody, and they do not appear in the Stores books.

The stock of spare parts not actually in use on engines or vehicles is kept as low as is possible, without having engines, or carriages and wagons standing idle, while damaged parts are being repaired; and such spare parts as are in charge of the Department having been charged off to Revenue are kept as stock under a numerical account only.

The Rajputana-Malwa, Carriage and Wagon Department and the Indian Midland hold all spare parts under an imprest, so that no pricing is required as they are all under capital suspense account at their original value, and are maintained at the cost of Revenue.

On the undermentioned lines returned stores are not considered serviceable until they have been repaired :—
Rajputana-Malwa, Locomotive Department,
Bengal-Nagpur.

To this end, damaged spare parts are sent first to the workshops, where they are repaired; in the first case they are then sent to the Departmental Stores, where they are taken on the books at the average price of similar articles already in the stores; in the second case after being repaired they are returned to the General Stores at a price fixed by the Locomotive Superintendent, which price I gathered is generally fixed at less than half the original cost of the article.

On the Eastern Bengal all articles are returned to Stores at a price fixed by the Locomotive Superintendent, and are subsequently repaired. This system leaves a loop-hole for manipulating the accounts, so as to reduce the expenditure in one half year at the expense of another, as the valuation plus the cost of repair may amount to more than the original cost of the article; not that I would venture to suggest that such a course has been pursued, but this procedure has admittedly that drawback.

On the Southern Mahratta, some spare parts are dealt with in a similar manner to that just described, while some are held under an imprest.

I venture to think that the practice obtaining in the Rajputana Malwa Locomotive Department is the correct one.

My ground for taking this point of view is the following extract from "The depreciation of Factories" by Ewing Matheson. 2nd edition, pages 1 and 2. Spon. London.

"The question of depreciation cannot be separated from that of maintenance, and "in theory one may be said to balance the other. In practice it is only in certain cases "that this can be acted on. In any particular building, machine, or appurtenance, decay or "wear of some sort must take place in the course of time, and repairs, in order to compensate "fully for the decline in value, must take the form of renewal."

"In only two kinds or classes of plant, however, can such an exact balancing of "loss by repairs and renewals be ventured on; one where the plant wears out so quickly as "to need replacement at short intervals, affording constant proof, by the mere continuance of "working, that not only the earning power of the factory is maintained, but also the capital "value; and in the second class, that of undertakings so large and permanent as to afford a "wide average of deterioration and renewal over the whole plant."

"For instance, on a Railway the deterioration of the fixed and moving plant is sup-"posed to be fully and properly met by the expenditure for repairs and renewals, and so long "as the working of the Railway is maintained, no regard is had to a future valuation such "as might disturb the accounts of a manufactory subject to a change of ownership or "cessation of trade."

This I take to mean that, as long as any part of the plant of a Railway is capable of being used for the purpose for which it was originally obtained, it is, to that Railway, worth the price it was originally obtained for, and no more: "so that any article that has been purchased for the use of the Railway, used for the purpose of earning Revenue, and partially or even totally worn out, when rendered serviceable by repair or renewal at the cost of Revenue, the serviceable article whether repaired or new, may legitimately and should be returned to Stores at a price equal to the original cost of that article, of which it takes the place." In the latter case Revenue being debited or credited with such difference in cost as may occur through such replacement.

The system in force on the Rajputana-Malwa, Carriage and Wagon Department, and the Indian Midland is also quite correct, provided the number of spare parts held under imprest is strictly maintained, as all spare parts not actually used in earning revenue are under capital suspense; no imprest system however can be so satisfactory, as an actual account.

The pricing of serviceable stores, that are likely to be left in stock for some time, is a matter that requires very delicate handling, and I could find no one prepared to express any opinion beyond, that each case required separate consideration.

F. On all of the lines visited, the stock of fuel in the company's possession is in charge of the Locomotive Superintendent, excepting only the East Indian Railway, where having their own Colliery Department, the arrangements are rather different.

On the following lines:—

Bombay, Baroda, and Central India,
Rajputana-Malwa,
South Indian,

all fuel is taken delivery of, stacked, and measured by the General Storekeeper.

On the

Great Indian Peninsular,

all seaborne fuel is taken over by the General Storekeeper. In all the above cases it is then handed over to the Locomotive Superintendent.

On the

Indian Midland,
Oudh and Rohilkund,
Bengal and North-Western,
Eastern Bengal,
Bengal-Nagpur,
Southern Mahratta,

and on the Great Indian Peninsular Railway as far as landborne fuel is concerned, all arrangements are made by the Locomotive Superintendent, who arranges with the contractors as to the quantities required, and the station where it is to be delivered. The contractor advises the Superintendent and the Foreman at the station of delivery of the wagon numbers, and the Foreman distributes the wagons as ordered by the Superintendent.

In some cases the transaction appears in the General Storekeeper's books.

The Indian Midland, and the Eastern Bengal were the only two lines from which I obtained any rules on this subject, the following extracts give all that is of importance, the remainder being purely local matter.

Indian Midland:—

(1). Purchases of coal will be arranged by the Locomotive Superintendent in conjunction with the Storekeeper on sanction from the Agent.

(2). A monthly advice of the quantity to be supplied will be sent to the District Locomotive Superintendents giving the different depôts to which distributed, and this should be communicated to the several Foremen concerned.

(4). The collieries will send Post Card advices to the Foreman to whom the coal is despatched, and a copy of these advices will be sent to the Head Office direct from the colliery.

(5). The Railway receipts will be sent direct to the Foremen to whom the coal is consigned, and after check, and countersignature by the Foreman must be sent to the Head Office for the issue of credit notes in clearance of the Railway freight. The Railway receipts together with the credit notes will be returned to the Foremen, and must be handed over to the Station Master.

(6). After transhipment from foreign into Home line wagons the coal must be despatched under material forwarding notes, and advice notes, to the Foreman for whom the coal has been ordered, separate advice notes and forwarding notes being used for each

description of coal. The advice note should show the description of coal, the numbers borne by the Home line wagons in which despatched, and the total quantity consigned.

(7). The coal on receipt at the several depôts should be checked against these advice notes, and taken to account, a separate return being submitted weekly for each description of coal. The non-receipt of a wagon, or the receipt of a wagon not entered on the advice notes should promptly be taken up by the District Officers with the traffic department, and an advice of the same sent to the Head Office.

(8). In the case of coal sent to a station where it has to be transhipped a weekly return of transhipments for each class of coal must be sent every Monday to the Head Office where it will be checked with the register of advices from the colliery, and with the quantities acknowledged at the different depôts. The register of advices will be maintained in the Head Office only and will be a complete record of the receipt of all coal, including cost, freight, and handling charges. It will be summarized at the end of each month to shew the quantity (and value) of coal consigned to each depôt.

(13). To agree the weekly returns submitted by the Foremen, with the coal register, a supplementary return will be prepared in the Head Office at the end of each month of wagons in transit to each depôt. On the wagon being acknowledged by the Foremen to whom consigned it will be struck off the "transit" return.

(14). Stock ledgers, recording quantity and value, will be maintained in the Head Office. These will be posted from abstracts of stores issued received from the Audit Office, and must be tallied monthly in respect of quantities with the weekly returns submitted by the Foremen. The Ledgers will be balanced monthly, and an average rate per ton struck, and this rate applied to the issues for the following month. Separate heads will be opened in the Stock Ledgers for each description of coal.

(16). In making issues 29 baskets of Bengal coal must be considered as equal to one ton, and this must not be varied except under orders from the Head Office.

(17). At the close of each month a survey of coal must be made by the Foremen and at the end of each quarter by the District Locomotive Superintendents. These surveys should be most carefully made, and must record measurements as actually taken. In converting the cubical contents of each stack to tons, 38 cubic feet of Bengal coal must be taken as the equivalent of one ton. Any difference brought to light by these surveys will be adjusted in the Head Office.

Eastern Bengal :—

(99). As much coal as possible must be taken by Drivers on the up journey, so that as little as possible may be taken at the upper stations for down journeys,and the cost of carriage thus economized.

(100). A couple of books of Form L. C. W. 59 will be supplied to each colliery with which the railway has dealings. This form is in three foils, and the manner in which each has to be dealt with is explained in the foot-notes to the several foils. On receipt in Head Office of the second part from the receiving Foreman, it will be checked with the third part received direct from the colliery, and the latter will then be returned to the colliery duly

signed by the Locomotive Superintendent. Head Office abstract will be posted from the second foils, and these foils will then be consecutively filed in files kept for the purpose for each colliery and for each description of coal.

(101). The Locomotive Coal Agent on the East Indian Railway will send his daily statement of despatches to the Head Office. These on receipt will be compared with the second foils of Form L. C. W. 59, and if found correct will be filed, otherwise any descripancy will be taken up with the Coal Agent and reconciled.

(102). After checking each consignment of coal with the second foil, Foremen will sign the Railway receipt and hand it over to the Station Master, who will treat it as a credit note, and forward it to the Examiner of Accounts as such.

(103). In addition to this, the Foreman must sign the station goods inwards book as a station voucher to receipt of the consignment.

On the East Indian Railway, each department draws its fuel from the Colliery Department as required ; the Locomotive Superintendent keeps a stock of fuel at each depôt, and this stock is checked fortnightly by the Foreman. No adjustment is made however until the stack is finished, and the existence of an excess or deficiency proved.

G. On the undermentioned Railways :—

Rajputana-Malwa,
Oudh and Rohilkund,
Eastern Bengal,
Bengal-Nagpur,
Southern Mahratta,

the State Railway sub-ledger form is used, one each month for each shop, and this is posted daily both as to labour and stores. It is as a rule totalled at the end of the month ; on the last named line each work order has three lines of the form, the first of which gives the expenditure for the day, which is entered in black ink, the second line gives the total to date for the month, and this is entered in red ink.

In the East Indian, Locomotive Department Workshop accounts the expenditure both as to labour and stores is being posted daily, but the stores entries are four days late as nothing can be entered until the priced abstract of stores issued is received, and as this abstract is prepared as to items at Jamalpur, and is priced at Calcutta, this delay is unavoidable, and taking into consideration the amount of the daily stores transactions is a very creditable performance.

On the following lines :—

Bombay, Baroda, and Central India,
Great Indian Peninsular,

labour and stores are posted daily on separate sheets, and these are not totalled until the end of the month, an addition sum at any moment would, however, show the expenditure to date.

In the following shops :—

Indian Midland,
Bengal and North-Western,
East Indian. Carriage and Wagon Department,

nothing is posted to the work orders until the receipt of the priced abstract of issues of stores, in the first two cases once a month, and in the latter case once a week; these abstracts are not received, however, in any of the above cases until about a fortnight after the end of the period with which they deal; the submission of the final accounts is consequently somewhat delayed, and it is impossible to find out what a work has cost until some time after it has been completed.

H. On all of the Railways visited the Superintendents keep all their own accounts submitting them in the form of abstracts B and C. The South Indian is the only line not working in this way.

I. There are two answers to this question, one being the allowance per mile or 100 miles run per engine, the other being the amount allowed per month for each engine stationed at a depôt.

As far as the first answer is concerned, the whole of the figures obtained are given in the remarks on fuel and oil premia, *vide* page 16; for the second answer, the East Indian Railway is the only line on which any scale of quantities of stores per engine per mensem has been laid down, and these figures are of no value for metre gauge engines.

J. Taking all the lines visited together there is practically no limit. On some of the Railways the out-stations hold their stores under an imprest, and details of some of these have been obtained. The general opinion of the various Superintendents was that the circumstances at various stations are so different, that it is almost impossible to analyse this question, or settle definitely what may be, and what may not be, kept in stock at every station.

The circumstances of the different Railways also influence the matter, as some Superintendents are in a position to supply spare parts as soon as they are wanted, whilst others having not sufficient facilities would be forced to keep engines waiting if spare parts were not kept at out-stations; as far as I was able to find out the imprests held by the out-stations on the South Indian Railway are not large as compared with stocks held at out-depôts on other lines. Copies of the imprest lists obtained are attached, *vide* Appendix C.

K. The remarks on the previous question apply to this also; it was generally considered incapable of analysis.

Lists of the staff employed at some of the out-depôts on some of the lines were obtained and are attached, *vide* Appendix D.

L. On all of the lines generally, each Foreman is allowed one Writer and one Stores issuer. There are circumstances in which an additional Storekeeper for fuel is allowed, and also in which additional Writers are allowed, but at most out-depôts only two men are sanctioned.

M. This question is best dealt with in tabular form, and has been so worked out. A depôt has been taken to mean a station where stores are kept, and can be drawn by Drivers, irrespective of whether there is a Foreman in charge or no. The number of out-depôt Foremen is also given, as well as the number of Carriage Examiners.

N. The State Railway system of Workshop accounts is said to be followed on the following lines:—

Rajputana-Malwa.
Oudh and Rohilkund.
Eastern Bengal.

Various modifications have, however, been introduced, the only case in which the code is followed in its entirety being apparently the Rajputana-Malwa, Carriage and Wagon Department; in the Locomotive Department it is looked on as unwieldy and unnecessarily elaborate.

On the other Railways it is followed where it is found suitable. Many of the State Railway forms and methods are undoubtedly good, but a great deal of the system is either too elaborate or else too meagre, while a great deal of it is vague.

1. Stores Account.

On the

Bombay, Baroda, and Central India,
Great Indian Peninsular,
Rajputana-Malwa,
Oudh and Rohilkund,
Eastern Bengal,
Bengal-Nagpur,
Southern Mahratta,

the prices of all stores are given on the issue notes, so that the person drawing the stores knows at once what their value is.

On the

Indian Midland,
Bengal and North-Western,
East Indian,

nothing is known of the prices of stores until the receipt of the Debit schedule from the Stores Accounts Branch.

Ledgers ruled for quantities and values are maintained in the General Stores by the General Storekeeper on the,

Great Indian Peninsular,
Rajputana-Malwa,
Bengal-Nagpur,
East Indian,

and by the Locomotive Storekeepers on the

Rajputana-Malwa,
Eastern Bengal.

The Storekeepers on the following lines keep only numerical Ledgers:—

Bombay, Baroda, and Central India,
Indian Midland,
Oudh and Rohilkund,
Bengal and North-Western,
East Indian,
Southern Mahratta.

The Storekeeper of the East Indian last referred to is in charge of the Branch Stores at Jamalpur, and supplies all material to the Locomotive Workshops.

The methods by which the Storekeepers of the first-mentioned lines are enabled to enter the prices on the issue notes, on such lines as keep only numerical Ledgers in the Stores are as under. On the Bombay, Baroda, and Central India, and on the Rajputana-Malwa, as far as stores for other departments than the Locomotive Department are concerned, there are a large number of clerks under the Chief Auditor, who keep the Stores accounts, situated in the same building as the Stores Department Office, and all issue notes are sent to them to have the values entered.

On the

Great Indian Peninsular,
Rajputana-Malwa. Locomotive Departmental Stores,
Eastern Bengal. Locomotive Departmental Stores,
Bengal-Nagpur,

the prices are obtained from the priced ledgers, and on the

Oudh and Rohilkund,
Southern Mahratta,

the prices are filled in from the price lists compiled and issued by the Chief Auditor.

The price charged for stores must be either the actual cost of the individual article issued, or the average price of all similar articles in stock.

The first-mentioned system is quite impracticable, as even if it were found possible to keep the different supplies of small articles separate, there would constantly arise the apparent discrepancy of, part of an issue of some article costing more than the rest of the issue, the whole issue being made of identical articles, of which one supply cost more than the other, owing to a fluctuation of the market price.

The only possible system is to issue stores at an average price.

This average price may be either an average struck at fixed periods, or it may be what I prefer to call the actual average price, that is to say, the average price of all the items under one Ledger head in the Stores at one time. This price is best arrived at, practically can only be arrived at, by striking the average, whenever a new supply is received.

This system is not only by far the more equitable, but I venture to think the only correct method of pricing stores, more especially in this country where large stocks have to be held of stores that are liable to fluctuations in price.

Stores purchased in the country need not be considered, as a contract is usually entered into for the year, at prices which are fixed for the year.

That this system of pricing stores (actual average price) is eminently practicable is shown by the fact that it is in force on the Bombay, Baroda, and Central India, and the Bengal-Nagpur, on neither of which lines are Locomotive Stores maintained, all stores being drawn for the Wo rkshops from the General Stores in the minutest quantity required.

I was informed that it was to be introduced on the Indian Midland from the beginning of this year, and the General Storekeeper on the Southern Mahratta expressed a wish to introduce it on that Railway.

I have heard only one objection raised against it, which was, that supposing one case or a part of a consignment to be lost, it is impossible to know whether any indemnity will be recovered from the shippers, or others, for the missing part of the consignment, or no.

In the system under discussion it is presumed that no compensation will be received, and the price is fixed accordingly.

Should any recovery on the value of the package lost be effected, the result is to reduce the price of similar articles in stock.

It is absolutely essential for correct accounting in the Workshops, that some price should be fixed for stores, and that very shortly after issue ; and if it be presumed that some compensation will be received for the part of the consignment that is missing ; in the case of nothing being recovered, the price will have to be enhanced.

In all cases the enhancement will be a larger percentage on the price than the reduction would be, for example :—

A consignment of four packages is invoiced at Rs. 1,000 it is presumed that one package has been lost, and will be recovered on.

Two packages are issued at Rs. 250 each = Rs. 500 ; no compensation is paid. The last package left in store must be issued at an increased price of Rs. 500 to close the transaction. Increase 100 per cent.

Under the same circumstances it is presumed that nothing will be recovered, and two packages are issued at Rs. 333-5-4 each, the last package would remain on the books at Rs. 333-5-4. Supposing the value of the lost package, Rs. 250 to be recovered the last package would be issued at Rs. 83-5-4, a reduction of only 75 per cent.

In either case an adjustment may, or may not have to be made, and the difference between actual and estimated figures would not be so great in the latter case.

As before mentioned the pricing on the Bombay, Baroda, and Central India is done by a staff of clerks under the Chief Auditor. On the Bengal-Nagpur, the General Storekeeper does this himself, no one else has anything to do with the stores, the Chief Auditor merely auditing the Stores accounts, which are entirely kept by the General Storekeeper.

On most lines a Stores indent form in triplicate is used ; the two detachable portions are sent to the Stores, one part is returned with the articles issued, showing exactly what has been supplied, this is signed by the person receiving the stores and is sent back to the General Storekeeper as his credit voucher, the General Storekeeper then sends the second part to the person who received the stores with the prices entered thereon.

Some mention has been made of numerical Ledgers kept by the Storekeeper on the

Bombay, Baroda, and Central India,
Rajputana-Malwa,
Oudh and Rohilkund,

this term is hardly correct as there are no Ledger books on the first two, but tally boards in a convenient form are kept attached to the bins, or lockers in which each item is kept; on the last named line, and in the Rajputana-Malwa Locomotive Stores, Ledgers are kept in the Stores offices, but tally boards are also maintained by the issuers.

A copy of this form is attached, *vide* Appendix E.

The cost of handling stores is on some lines debited to the departments using the stores.

On the Oudh and Rohilkund this charge is debited 50 per cent. to the Locomotive, and Carriage and Wagon Department, and 25 per cent. each Engineering and Traffic Departments.

On the Southern Mahratta a fixed sum is debited to the Locomotive and Carriage Department monthly, the rest appearing under Abstract E ii 5.

On most lines stores for the Traffic Department and such articles as oil, waste, lampwick, &c., for the Engineering Department are issued quarterly; on some, traffic stores are put into stores vans and sent to the District Officer who arranges for their distribution.

Locomotive stores are despatched monthly.

On the Bengal-Nagpur, the General Storekeeper is provided with a list giving the maximum number and minimum number of spare parts of the different classes of engines which he should keep in stock. The maximum is about one year's consumption, the minimum about enough for three months.

A separate ward is kept for each class of engine, and all material including wheel tyres, axles, boiler plates, &c., is kept together.

On the Oudh and Rohilkund large masonry tanks have been built underground for storing mineral lubricating oil, they are said to be very suitable for the purpose.

On the Southern Mahratta glass show cases containing sealed patterns of all stores purchased in the country are arranged in an easily-accessible position in the main Stores building.

On many of the lines, stores are despatched to out-stations very promptly after the receipt of the requisitions, the following is the programme on the East Indian Railway, as far as the Locomotive Department is concerned :—

Stations.	Latest safe day for receipt of indents in Loco. Supt.'s Office.	Latest safe day for receipt in Stores Office.	Date of despatch.
Umballa, Cawnpore, Tundla, Ghaziabad ...	23rd	26th	1st
Aligarh, Manouri	28th	1st	3rd
Jubbulpore, Sutna, Allahabad	29th	2nd	7th
Moghal Serai, Buxar, Dinapore	2nd	5th	9th
Gya, Mokameh	4th	7th	10th
Howrah, Burdwan, Rampore Haut	5th	8th	12th
Sahebgunge	8th	11th	13th
Assensole, Madhapur, Nawadih	9th	12th	16th

The 1st, 3rd, 4th, 6th, and last batches are sent in stores vans.

2. Payment of Drivers and Firemen.

The rules under which Drivers and Firemen are paid vary very considerably on the various Railways, and it is rather difficult to make comparisons.

On the following lines, a full month's pay is guaranteed, provided the men are available for duty all the time.

Bombay, Baroda, and Central India,
Great Indian Peninsular,
Indian Midland,
Oudh and Rohilkund,
Bengal and North-Western,
East Indian,
Southern Mahratta.

On the following lines a month's work consists of 208 hours, and no overtime can be drawn until this has been worked :—

Great Indian Peninsular,
Indian Midland,
Bengal-Nagpur,
Southern Mahratta.

This time is made up in various ways, the greater part of it is of course the time-table time for the train worked, to this various allowances are added, such as time for examining engines before, and after working, day allowance, night allowance, and allowance for traffic free shunting time. These allowances vary on the different lines.

On the undermentioned lines each day's work counts by itself :—

Rajputana-Malwa,
Oudh and Rohilkund,
Bombay, Baroda and Central India,
Bengal and North-Western,
East Indian,
South Indian,

this is in some cases worked on a trip system, in others pay is calculated on the number of hours worked.

On the Oudh and Rohilkund, Mail and Passenger trains are worked on a contract system. In October 1896 one man worked 6,476 miles, thus earning at 13·5 pies per mile Rs. 455-5-6. This system is naturally very popular, but only the most experienced and reliable men are allowed to work to it.

On the Eastern Bengal State Railway every man has a substantive monthly pay, which is in the nature of a retaining fee. In addition to this, one day's pay is paid per 100 miles run. The rules for this system are very simple, but it does not seem an altogether satisfactory one. The two generally-adopted systems are well illustrated by the rules for the Great Indian Peninsular and those for the Rajputana-Malwa Railways, *vide* Appendix F.

The first is the more equitable, and is eminently satisfactory, where the Drivers doing the responsible work are on higher pay than those running mixed and goods trains.

The second equalizes the amounts of pay drawn by all the different classes of Drivers, but this amount is earned by Mail Drivers working less hours.

The published rules of the following lines have been obtained, and are attached :—

Great Indian Peninsular,
Rajputana-Malwa,
Indian Midland,
Oudh and Rohilkund,
East Indian,
Eastern Bengal,
Bengal-Nagpur,
Southern Mahratta.

On almost all of these Railways, Drivers and Firemen receive the increases to their salaries regularly every year to the extent of their grade; provided of course that it has not been forfeited by misconduct.

On most lines rules are laid down prescribing the number of hour's rest that a Driver should have after a day's work both at out-stations and at home, and giving compensation for reduced rest below the prescribed time. This matter has not so far been dealt with on the South Indian. Running rooms, with a double staff of servants for day and night, are everywhere provided. Boys are paid by the Companies to carry the Drivers' boxes from the engines to the running rooms, and *vice versâ*.

On some lines Natives have to work longer hours per diem than Europeans. This is, I think, a not very desirable arrangement, as in addition to the liability to cause ill-feeling, it undoubtedly complicates the calculation of wages, and the case is easily met by the lower scale on which they are paid.

Covenanted Drivers are on most lines under the covenanted leave rules.

3. FUEL AND OIL PREMIA AND CONSUMPTION SHEETS.

On all of the Railways visited statements are prepared showing the consumption of coal, wood, oil and tallow per train-mile, per engine-mile and per vehicle-mile, and the most careful comparisons are made as to the consumption of different men.

On the undermentioned Railways premia at various rates are paid to those men who are lightest on fuel and oil :—

Bombay, Baroda and Central India,
Great Indian Peninsular,
Rajputana-Malwa,
Indian Midland,
Bengal and North-Western,
East Indian,
Eastern Bengal.

On the Great Indian Peninsular and the Indian Midland, the sum which a Driver receives is more in the nature of a reward; on the other lines mentioned a fixed allowance per vehicle-mile, or 100 vehicle-miles is laid down, and all Drivers using less than this amount

are paid so much per ton saved. These fixed amounts are of no comparative value as far as the Broad Gauge lines are concerned; they are however available.

The allowances on the Rajputana-Malwa Railway per vehicle per mile are :—

Class of coal.	Road.	Mail and Mixed.	Goods.
English	Level	0·70 lbs.	0·75 lbs.
English	Hilly	0·75 ,,	0·92 ,,
Country	Any	0·90 ,,	0·95 ,,

per 100 engine-miles 130 oz. oil and 8·5 oz. waste.

An equivalent number of vehicles is allowed for train, dead, and light engines.
90 lbs. coal per hour is allowed for shunting.
30 lbs. coal per hour is allowed for standing in steam.
The consumption sheets are made out quarterly and premia paid at the following rates :—

	Per ton of coal saved. Driver. Rs. A. P.	Fireman. Rs. A. P.
European Driver with European Fireman ...	3 0 0	1 0 0
European Driver with Native Fireman ...	3 8 0	0 8 0
Native Driver with Native Fireman ...	1 0 0	0 8 0

subject to the following maxima :—

European Driver ...	Rs. 75	European Fireman ...	Rs. 20.
Native Driver ...	,, 20	Native Fireman ...	,, 10.

Drivers are made to pay for excessive consumption at the stores issuing price.

On the Bengal and North-Western Railway the rules are somewhat simpler; 0·90 lbs. coal are allowed per vehicle per mile for any train on any part of the line; 7 lbs. oil and tallow per 100 engine miles; premia are paid quarterly on the following scale :—

	per ton of coal or lb of oil saved.	Maxima. Rs.
European Driver ...	20 per cent. of value ...	75
Native Driver ...	10 do. ...	30
Native Fireman ...	5 do. ...	15
2nd Fireman ...	3 do. ...	6

The fuel consumption sheets are prepared for each month, and any excess in one month is deducted from the other two months, and any excess during the quarter is recoverable at the discretion of the Locomotive and Carriage Superintendent.

Allowances are made for shunting, ballasting, &c.

On the Eastern Bengal State Railway Metre Gauge section, the allowances are as under :—

Mail, Mixed and Local trains.	Assam coal 0·70 lbs. per vehicle-mile. Bengal coal 0·75 lbs. per vehicle-mile.
Goods trains	0·60 lbs. per vehicle-mile.
All trains	6 pints oil per 100 engine-miles.

I was told that no one had succeeded in earning any premium under the above scale.

The forms in which some of the Companies keep their fuel accounts have been obtained, and are available, should it be considered desirable to start something of the sort on the South Indian Railway.

As exhibiting the results of the fuel premium system, the following figures are taken from one of the sheets for the quarter ending September 1896 on the Bengal and North-Western Railway.

This sheet dealt with 46 sets of men.

The value of the coal used below the allowance was Rs. 1,993-4-9, and the value of the oil saved Rs. 372.

The amounts paid in premia were to Drivers Rs. 323-5-0, to Firemen Rs. 121-14-1, to 2nd Firemen Rs. 68-4-10.

		Rs.	A.	P.
Value of stores saved	...	2,365	4	9
Amount paid in premia	...	513	7	11
Saving to Compy. for one quarter	...	1,851	12	10
Do. per annum	...	7,407	3	4

This was for part of the line only.

4. LOAD TABLES.

On the following Railways the load tables for all trains are got out in vehicles:—

Bombay, Baroda and Central India,
Rajputana-Malwa,
Indian Midland,
Oudh and Rohilkund,
Bengal and North-Western,
Eastern Bengal,
Bengal-Nagpur.

On the Eastern Bengal the question of working on a tonnage basis was raised some time ago, but the matter was eventually dropped as it was concluded that nothing would be gained by it.

On the Great Indian Peninsular Railway the loads for passenger and mixed trains are got out by the number of axles; one axle in excess of the load is not counted. The loads of goods trains are got out on a tonnage basis; 5 tons in excess of the load is not counted. Instead of taking the actual tare of each wagon, an average tare for each class of wagon is fixed.

On the East Indian Railway the loads of passenger trains are got out in vehicles, of goods trains in tons; in this case the tare is taken to be the nearest number of whole tons. All wagons, except those loaded with minerals, are taken as being loaded within one ton of their marked carrying capacity, and wagons loaded with minerals as full loads.

For mixed trains the load is given in coaching vehicles, and a coaching vehicle is taken as weighing 12 tons and a loaded goods vehicle as weighing 18·5 tons. Thus in a train

whose load is 20 passenger vehicles, and on which there are only 10 passenger vehicles = 120 tons, the nearest number of goods vehicles at 18·5 tons each which will be equivalent to the other 10 passenger vehicles = 120 tons may be added, in this case 7. This has been worked out for every possible number of passenger vehicles on the train, up to the full load.

Certain provisions are made for the substitution of wagons carrying an increased load.

On the Southern Mahratta Railway all goods train loads are given in maunds, subject to a maximum number of vehicles; passenger and mixed train loads being got out by vehicles.

The policy on the last-named line seems to be to put just as great a load on goods trains as the engine is able to pull, even at the lowest speed.

5. REGISTERS OF WHEEL AND AXLE MILEAGE.

On only five lines are the above registers regularly kept, and then only for engine and tender wheels and axles. These are

Indian Midland,
Oudh and Rohilkund,
Bengal and North-Western,
Southern Mahratta,
East Indian.

On the last-mentioned line two registers are maintained, one for axles and one for tyres; although more bulky, the total number of entries is considerably reduced.

On the Great Indian Peninsular Railway a register has been opened for some axles that have been supplied under a guarantee; as soon as this mileage is completed, the register will no longer be kept.

On the Rajputana-Malwa Railway, when a new axle is fitted, the number of the engine under which it is placed, and the date on which it is so placed, are stamped on one end. Whenever and wherever this axle is taken out from, or put under an engine, the date of so doing is stamped on it, and this numbering and dating is repeated, so that the end of the axle has rows of three sets of figures stamped on it, these figures being: i, Number of engine; ii, Date placed under; iii, Date taken out. When this axle comes into Head-quarters, the mileage of the engines under which it has run, during the periods between the dates, is obtained from the Engine Ledger, and the total mileage is stamped on it. Each axle thus becomes its own register.

My attention was called to G.O., P.W.D., 22 R. of 12th July 1879, which cancels the orders for these registers being kept.

On the Eastern Bengal State Railway and the Bengal-Nagpur Railway wheels and axles are kept as far as possible under the same engine, so that the mileages are assumed to be the same.

No attempt is made on any line to keep the mileage of carriage and wagon wheels and axles; a register was opened some years ago on the Rajputana-Malwa Railway, but was found to be impracticable.

A register of the mileage of engine wheels and axles is now kept on the South Indian Railway.

6. TESTING WHEELS AND AXLES.

On no Railway have any rules been laid down as to the method in which these tests are to be conducted, and opinions differ as to the possibility, or advisability of doing so.

On all lines the utmost care is enjoined on the part of all who have to conduct the examination of wheels and axles, and on some suggestions as to the way in which it should be done are offered.

On the Rajputana-Malwa, when the coupled wheels of engines come into the shops, the cranks are pulled back for 1½ inches; the whole is rapidly wiped over with kerosine oil and dried; it is then covered with whitening and water, and stood out in the sun; any cracks become discernible through the brown stains in the whitening caused by the oil exuding from them.

The Locomotive Superintendent assured me that cranks had been drawn back and replaced as many as six times.

The use of whitening and water after thorough cleaning is in force on some other lines.

The Locomotive Superintendent of the Bengal and North-Western Railway informed me that when he had had occasion to draw cranks back, he replaced them fastened with five keys spaced at angles of 72°.

On several lines periods are fixed at which examinations are to be made, either in time, or mileage.

On most lines all engine cranks are turned in a quartering machine, and those lines that have no quartering machine, turn the pins independently with a crank pin-turning machine; the general practice is to allow crank pins and journals to be turned down to nine-tenths of the original diameter, although on some lines they are reduced very much below this. Attempts have been made to bush pins that have become small through wear; there is nothing to be gained by this, as the pin is in no way strengthened.

The quartering machine at Negapatam is employed its whole time in boring out rolling stock wheel centres for the large size axle, which it does four at once.

In the East Indian Carriage and Wagon Shops plant has been erected for testing axles, but I was unable to learn anything of its being used.

On the Southern Mahratta, ten carriage and wagon axles are tested every quarter; the test consists of ten blows with a weight of 2 tons falling from a height of 40 feet; this gives a blow of 960 inch tons. I did not learn the distance apart of the supports.

7. SPRINGS.

On several of the Railways visited trouble has been experienced with the plates of laminated springs shifting in their buckles; this is more especially found in engines fitted with compensating beams. This trouble has been in some cases overcome, in others means of correction have been applied.

On the Rajputana-Malwa Railway the three top plates of the spring have notches cut out of the side in the middle of their length; these notches are about 1″ long and about

⅜″ wide, and engage with two feathers formed in the spring buckle. These three plates are put into the buckle first, and after the remainder have been put in, the whole is made taut with a wedge piece at the bottom forced in in a specially arranged hydraulic press.

The Locomotive Superintendent assured me, that since he had adopted these methods, he had considerably reduced the number of broken springs.

On the Bengal-Nagpur a pin of oblong section, about ½″ × $\frac{3}{16}$″, with its greatest dimension lengthways of the spring, is driven right through the buckle and the plates, and rivetted over at the top and the bottom.

On some other lines the trouble has been met by practically blocking the movement of the compensating beam; the disease is in this case preferable to the remedy.

On the Southern Mahratta the driving and trailing springs of O class engines have been fitted with a buckle that is clamped on to the spring with nuts; Drivers are thus enabled to slack back the nuts, and put the plates straight themselves if any shifting is observed.

On the East Indian Railway the numbers of types of spring buckles is considerably reduced, by using one size, for springs having less plates than the buckle is capable of taking and filling up with packing pieces.

On most Railways all the springs are tested in an ordinary steam spring puncher. This is alright for carriage and wagon springs, but for engine and tender springs a machine giving quantitative results is required. A very convenient machine has been laid down in the shops of the Indian Midland Railway. It is arranged to be worked by power from the line shafting, the load being applied by a weight sliding on a steel yard, and was supplied by Bailey of Salford.

The undermentioned lines have machines giving quantitative results:—

Great Indian Peninsula,	Rajputana-Malwa Loco. Dept,
Indian Midland,	Eastern Bengal Broad Gauge,
Eastern Bengal Metre Gauge,	Bengal-Nagpur.

Of these, the Eastern Bengal Broad Gauge and the Bengal-Nagpur are hydraulic presses, and the load is read from the pressure gauge. This is not very satisfactory, as these gauges rapidly deteriorate.

The other shops visited are all using steam spring testers, from which it is impossible to obtain measurements of any value.

The Carriage and Wagon Superintendent of the Rajputana-Malwa Railway expressed a wish to revert to the use of India rubber, provided the desired quality was obtainable, for coaching stock. Several vehicles have been fitted with these springs, and are said to be running very well indeed. Good India rubber is however expensive.

8. LIGHTING.

On the

Bombay, Baroda and Central India,
Great Indian Peninsular,
Indian Midland,
East Indian,
Eastern Bengal Broad Gauge,

Pintsch's gas is used for the lighting of mail trains, and on some of the above for passenger and mixed trains as well.

I was unable to obtain any figures, as the system has been in use for such a comparatively short time, that reliable figures are only just beginning to be obtained.

The Indian Midland is using a particularly neat form of lamp, which although slightly more expensive than the pattern in use on the other lines has many advantages, the principal being: that it is entirely self-contained, each lamp having its own by-pass valve attached; all work such as cleaning and lighting are done from the inside, it is consequently quite unnecessary for anyone to go on to the roofs of the carriages, and the lighting can be done with a small lamp burning vegetable oil, instead of a kerosine torch; it being unnecessary to swing the burner to one side to clean the glass lamp bowl, there is much less chance of the glasses being broken; there is less liability to leakage through the roof of the carriage, as all external joints with the lamp are permanently made.

The pattern in use in the bath rooms of 1st and 2nd class carriages would be most suitable for a metre gauge carriage.

My attention was called to the importance of fixing all the pipes in easily accessible positions, and of not fastening them too rigidly to the carriage, also to the necessity of providing cement-lined iron tanks for the storage of the oil.

On the Eastern Bengal Railway a pattern of roof lamp burning kerosine oil is in use; those that I saw lighted did not give a very satisfactory light.

The gas accounts on the Indian Midland are kept in a very convenient form.

On the Bombay, Baroda and Central India Railway, the light distillate from the gas-works is used for washing oily waste.

9. Carriage Cleaning.

On the following Railways:—

Bombay, Baroda and Central India,
Great Indian Peninsular,
Oudh and Rohilkund,
East Indian,
Southern Mahratta,

rules have been laid down as to the manner in which the cleaning of carriages is to be conducted, copies of these rules are attached, Appendix G.

Most lines have issued orders as to where the carriages of certain trains are to be cleaned, and this is, I think very desirable, as fixing the responsibility when carriages are found in a dirty state.

I was unable to hear of any soap that will effectually remove the dirt, without at the same time spoiling the varnish, the general opinion being that soap should never be used except when carriages are found to be abnormally dirty, and even then only very sparingly.

On most lines where soap is used at all, the best English soft soap is used, although some prefer good hard bar soap.

On the Bombay, Baroda and Central India, a very weak solution of Ingham Clarke's Brittania composition has been used with success, but if mixed too strong it will remove the varnish.

Plenty of clean water, with proper soft carriage washer's brooms is considered the best thing all round.

On the East India Railway at Howrah, an arrangement, which was originally designed for testing the water-tightness of covered goods wagons, is in use. This consists of a sort of cage of pipes, spanning one line of rails, the pipes are perforated on the inside, and a train of vehicles drawn slowly through this arch gets a most thorough wetting. It seemed to be most effective, and the cost of erection cannot have been very great.

Although not, perhaps, quite relevant to the subject under consideration, I may here mention that before any covered goods wagon is allowed out of the Indian Midland workshops at Jhansi, a man gets inside, and the doors are shut; streams of water, from a couple of fire hose and nozzles, are then directed all over the wagon, if the man inside detects the slightest leakage, the wagon is kept back until this has been remedied.

10. Examination of Vehicles.

The practice on different Railways as to the oiling of vehicles varies very considerably.

On some lines it is the rule to put a little oil into every axle-box at nearly every examining station; on others no oiling is done at all except at the time of periodical examinations.

On the following Railways the axle boxes of vehicles are examined at the ends of the periods written opposite:—

Railway.	Coaching Stock.	Goods Stock.
Bombay, Baroda and Central India,	———	3 months.
Rajputana-Malwa,	1 month.	1 month.
Oudh and Rohilkund,	1 month.	1 month.
East Indian,	1 month.	1 month.
Indian Midland,	2 months.	4 months.
Eastern Bengal,	3 months.	3 months.
Bengal-Nagpur,	1 month.	1 month.
Southern Mahratta,	1 month.	1 month.

and the vehicles are lifted, and wheels, axles, axle boxes, and all running gear overhauled as in the table below:—

Rajputana-Malwa,	1 year.	1 year.
Oudh and Rohilkund,	1 month.	———
Indian Midland,	8 months.	1 year.
Eastern Bengal,	1 year.	1 year.
Bengal-Nagpur,	6 months.	6 months.
Southern Mahratta.	6 months.	6 months.

On the last named line carriage examiners do not lift bogie carriage stock, this work being undertaken only in the Hubli workshops; all of the stock is supposed to come into the shops once in two years.

On the Indian Midland all lifting work is done in the Jhansi shops, that is to say all the coaching stock passes through the shops every 8 months and all the goods stock every year.

On many lines a table is laid down showing the number of vehicles to be dealt with daily by each examiner; that is to say on a line where every vehicle is supposed to be lifted once a year, the total number of vehicles is divided by say 300, the number of working days in a year, the quotient is then distributed among the various examining stations, as the number to the dealt with daily.

I was informed that the use of mineral oil, had on several lines led to the reduction of the periods between examinations.

On the Eastern Bengal the Locomotive Superintendent told me that he was thinking of reducing the interval between examinations, although he had run vehicles with sealed boxes for 35,000 miles with only one oiling. Locked boxes are however like the proverbial watched kettle.

The Carriage and Wagon Superintendent of the East Indian Railway, had considered the matter of using mineral oil, owing to the present dearth, and consequent high price of castor seed, but was inclined to think that the castor oil would be cheaper, as it is better, in the long run. On this line all oil is expressed from the raw seed at the Company's oil mill; varnish and grease are also manufactured.

The Bombay, Baroda and Central India Railway has also its own oil mill.

This systematic periodical examination of vehicles certainly tends to keep the numbers of vehicles detached for hot axles at a very low figure.

The following figures were obtained from the Rajputana-Malwa :—

Year.	1894.		1895.		1896.
Half year	1st	2nd	1st	2nd	1st
Journals, hot	111	131	125	130	120
Total ...	242		255		120
Vehicles on line	8,828	8,781	8,785	8,776	8,739
Journals on line	41,418	41,418	41,430	41,530	41,494
Vehicle mileage	93,848,113	76,014,464	88,702,053	62,862,117	69,831,357
Total ...	169,862,577		151,564,170		69,831,357
Percentage of hot, on total journals	0·27	0·32	0·30	0·31	0·29
Means ...	0·295		0·305		0·29
Vehicle miles per hot journal.	845,478	580,254	709,616	483,554	581,928
Means ...	701,911.		594,369.		581,928

11. Repairs at Out-station.

On all of the Railways visited, the amount of repairs done at out-stations, is with the exception of the Great Indian Peninsular, cut down to the lowest possible figure.

On the Great Indian Peninsular there are large workshops at Igatpuri, Bhusawal, Lanouli, and Jubbulpore where repairs of all sorts are done, to both engines and vehicles; these I was given to understand the Locomotive Superintendent would be glad to close, were it possible to cope with the work at the Parel workshops, as he considers that all work can be done both better, and cheaper than it is possible to do it at out-stations, at head-quarters; this I may add was the general opinion of most of the Superintendents, whom I spoke to on this matter. On some lines goods vehicles are dealt with very largely at out-stations, in most cases this is the outcome of either insufficient accommodation, or the works not being situated conveniently for getting wagons in for repairs without a great deal of light mileage.

On most Railways the repairs to engines at out-stations are reduced to the replacing of worn or broken parts by new or repaired ones, and the ordinary running repairs.

12. Brasswork.

On most lines, the best of the old brasswork is picked out and kept, while the small stuff and borings are sold.

On the Bombay, Baroda and Central India, and the Rajputana-Malwa no old brass is ever used, it is all run into ingots and sold; new metal being invariably used for the Company's work.

This is no doubt very nice, and is the practice in Government works, and as long as a good price is obtainable it probably pays. On the Rajputana-Malwa I was told that about Rs. 30 per cwt. was the usual selling price.

The Carriage and Wagon Superintendent of the East Indian Railway expressed his intention of following this practice in the future for axle-box brasses; already in the Locomotive Department, all important work, such as bearings, &c., are made of new metal, the old metal being used for injector casings, gauge column fittings, &c., &c.

On many lines experiments have been made with one or more of the patent bronzes now in the market, such as Stone's bronze, Phosphor bronze, &c., and although admitting their admirable qualities most Superintendents have not used them largely, considering them by far too expensive.

Fletcher's patent crucible furnaces are very largely used in the brass foundries; I do not think I saw any brass foundry that had not one, or more.

13. White Metal.

On many lines white metal is used for lining up bearings, either one of the many patent metals, or a mixture made in the country.

On the Oudh and Rohilkund it is used by itself for an enormous number of purposes, and is said to answer uncommonly well, it is cast in chills and requires no machine work whatever, and if the chills are properly made requires the least possible amount of fitting.

On the Southern Mahratta, a locally made white metal is used for side rod bushes; it has a small percentage of phosphorus in it, and works very well; these bushes are also cast in chills, and require no fitting at all.

14. PIECE-WORK.

The Great Indian Peninsular and South Indian are the only Railways where all work is done by day work. On the former line, some years ago, all work that could possibly be arranged, was done by petty contractors in the workshops. This was, however, found to be objectionable, as the Company had practically no control over the labour, the workmen not being in the Company's service kept what hours they pleased.

On the

Bombay, Baroda and Central India,
Rajputana-Malwa Carriage and Wagon Shops,
Oudh and Rohilkund,
Bengal and North-Western,
East Indian,
Eastern Bengal,
Bengal and Nagpur,
Southern Mahratta,

a very great deal of piece-work is done. On most of these lines, everything that possibly can be, is done in this manner, and as little day work is allowed as possible.

On the Indian Midland a certain amount of work is done by petty contract..

The Locomotive Superintendent of the Rajputana-Malwa wishes to stop piece-work in the workshops in his charge, as he considers that it elaborates the accounts. This it undoubtedly does, but it has the great advantage of leaving the Foremen free to look after the quality of the work, instead of having to be continually on the alert as to the quantity.

15. SUPERVISING STAFF.

The following list gives the numbers of Foremen and Assistant Foremen employed in the various workshops visited. A sheet showing their charges in tabular form is attached *Vide* Appendix H :—

Bombay, Baroda and Central India	8 Foremen.
Great Indian Peninsular	2 Work's Managers. 21 Foremen and Assistants.
Rajputana-Malwa Carriage and Wagon ...	6 do. do.
Indian Midland	1 Work's Manager. 6 Foremen and Assistants.
Oudh and Rohilkund	1 Work's Manager. 9 Foremen and Assistants.
East Indian Locomotive	1 Work's Manager. 18 Foremen and Assistants.
East Indian Carriage and Wagon	11 Foremen.
Eastern Bengal Broad Gauge	8 do.
Eastern Bengal Metre Gauge	3 do.
Bengal-Nagpur	6 Foremen and Assistants.
Southern Mahratta	9 do. do.
South Indian	7 do. do.

16. THE OUTTURN FROM THE WHEEL LATHES was obtained from the following Railways :—

Rajputana-Malwa,
Eastern Bengal Metre Gauge,
S uthern Mahratta,
South Indian.

In the Rajputana-Malwa Locomotive Shops there are seven wheel lathes, the annual outturn from which is about 1,100 pairs.

In the Rajputana-Malwa Carriage and Wagon Shops there are seven wheel lathes, and the outturn for the six months (January to June 1896) was :—

2,223 pairs of wheels turned.
1,200 wheel centres bored out to 4¼″ diam.
600 axles turned on both wheel seats.
272 axles turned on both journals.

In the metre gauge shops on the Eastern Bengal State Railway, there are six wheel lathes ; three of which are always employed on carriage and wagon wheels, two are generally working on engine and tender wheels, the sixth being sometimes used for one, and sometimes for the other ; the average monthly outturn is—

175 pairs of carriage and wagon wheels turned.
32 pairs of engine and tender wheels turned.
17 carriage and wagon tyres bored.

In the shops at Hubli on the Southern Mahratta Railway, there are two engine and tender wheel lathes and four carriage and wagon wheel lathes.

The following were the figures as given :—

From 29th June 1896 to 31st July 1896.

Engine and tender wheels turned	58 pairs.
Carriage and wagon wheels turned	190 do.

In August 1896.

Engine and tender wheels turned	65 pairs.
Carriage and wagon wheels turned	128 do.

In September 1896.

One carriage and wagon wheel lathe under repair.

Engine and tender wheels turned	63 pairs.
Carriage and wagon wheels turned	92 do.

In October 1896.

Engine and tender wheels turned	43 pairs.
Carriage and wagon wheels turned	130 do.

In November 1896.

Engine and tender wheels turned	34 pairs.
Carriage and wagon wheels turned	126 do.

Up to the 15th December 1896.

Engine and tender wheels turned	18 pairs.
Carriage and wagon wheels turned	40 do.

Total from 29th June 1896 to 15th December 1896 (6 months).

Engine and tender wheels turned	281 pairs.
Carriage and wagon wheels turned	706 do.

In addition, the following work was done in these lathes in the above-mentioned period :—

In September, 6 pairs; in November, 6 pairs; and in December, 12 pairs—total 24 pairs of wheels had the tyres grooved down to the set screws.

In July, 77 pairs; in August, 38 pairs; in September, 40 pairs; in October, 52 pairs; in November, 16 pairs; and in December, 17 pairs—total 240 pairs of journals were turned.

As before noted, one carriage and wagon wheel lathe was under repair for one month.

On the South Indian there are six engine wheel lathes, four wheel lathes used for tender and carriage and wagon wheels, and six lathes for carriage and wagon wheels only.

The outturn from these for the year 1895 was as under :—

249 pairs of engine wheels turned.
164 pairs of tender wheels turned.
1,918 pairs of carriage and wagon wheels turned.

There are two tyre-boring lathes, and the outturn from these was—

191 engine tyres.
42 tender tyres.
476 carriage and wagon tyres bored.
1,775 carriage and wagon wheel centres were bored out to 4″ diam. on the last-named line, but not in the wheel lathes.

The following table gives the figures for one year compiled from the above, and shows work done in wheel lathes only :—

Name of Railway	R. M.	E. B. S.	S. M.	S. I.
Number of engine and tender wheel lathes ...	7	2	2	3
Do carriage and wagon do ...	7	3	4	6
Do lathes used for both	...	1	...	4
Do engine and tender wheels turned ...	1,100	384	562	413
Do carriage and wagon do ...	4,456	2,100	1,412	1,918
Do axles turned both journals	544	...	480	...
Do do do wheel seats	1,200	...	...	...
Do tyres bored	...	204	...	...
Do do grooved	...	...	48	...
Do wheel centres bored	2,400	...	...	...
Do engine and tender wheels lathes ...	7	2·5	2	5
Do do do do turned ...	1,100	384	562	413
Do do do do do per lathe.	157·14	153·6	281	82·6
Do carriage and wagon wheel lathes ...	7	3·5	4	8
Do do do wheels turned ...	4,456	2,100	1,412	1,918
Do do do do per lathe.	636·57	600	353	239·75
Do all do do ...	396·86	414	329	166·5

17. Accounting Generally.

It has been already explained, *vide* Question G, page 24, how the work ledgers are posted on the different lines, and there now only remain the workshop manufacturing accounts to be considered.

These are, of course, simple debtor and creditor accounts; the debit side of which is quite simple, consisting of the debits for stores and wages of the shop; the credits are in some cases only arrived at by very complicated methods.

The three accounts calling for special notice are i. Foundry, ii. Smiths' shop, and iii. Sawmill, and these will be taken in order.

i. Foundry accounts.

On the
Bombay, Baroda and Central India,
Great Indian Peninsular,
East Indian,
Eastern Bengal,
Oudh and Rohilkund,

castings are not classed; that is to say, the total debits are divided by the total credit, in weight of outturn, for each sort of metal; which gives a rate per cwt. or ton, as the case may be, for all castings made of that metal, however intricate or simple.

On the Indian Midland, castings are divided into two classes, one intricate, the other simple, and the debit is so divided that the cost of one class shall be double the other.

On the
Rajputana-Malwa,
Bengal and North-Western,
Bengal-Nagpur,
Southern Mahratta,

castings are classed, and the procedure is the same as described in Volume IV, P. W. D. Code, that is to say, the debit for stores is divided according to the actual total weight of the outturn, the debit for labour being divided according to the weights of each class multiplied by a figure, which is supposed to represent the proportional expense of making the moulds.

These constants are, for the different Railways, as given below.

It will be seen that a much more minute sub-division is adopted on some lines than on others.

Bengal and North-Western, three classes for both cast iron and brass, the relative ratios being 2·0, 1·5, and 1·0.

Bengal-Nagpur, five classes for iron castings only, the relative ratios being 4·0, 2·0, 1·0, 0·75, and 0·5.

Southern Mahratta, four classes for iron castings, the ratios being 2·0, 1·7, 1·3, and 0·5.

Three classes for brass castings, the relative ratios being 4·0, 3·1, 0·66, and the same number for white metal, of which the ratios are 4·0, 3·0, 0·66.

ii. Smiths' shop accounts—

The Indian Midland is the only line apparently that classes forgings, and this is merely for convenience in describing them, as I could not find that any division of the cost of labour was made beyond the actual weight ratio.

iii. Sawmill accounts—

The debits in this account are perfectly simple; the credits are in some cases very elaborate indeed.

On the Rajputana-Malwa, this account is kept in the way described in the appendix to Volume IV of the code. At the time of my visit a committee was sitting to enquire into the advisability of continuing this system, and I gathered that it was considered that a simpler method was desirable.

The units adopted on the Rajputana-Malwa are—

$12'' \times \frac{1}{2}''$ planks or 6″ square inches section	4
$12'' \times 1''$ planks or 12″ square inches section	3
Any cut timber of larger section	2

On the Indian Midland a somewhat simpler system is in force, as there are not so many units to be considered; those in use are—

Boards, all timber, 2″ thick or under	5
Scantlings, all timber, over 2″ thick	4

On the Southern Mahratta the same system is in force, but it has been much elaborated.

The units adopted are as under :—

Thickness of Scantlings.	Unit for distribution.	Thickness of Scantlings.	Unit for distribution.
$\frac{5}{8}''$ and under	20	$2\frac{1}{4}''$	6
$\frac{3}{4}''$	17	$2\frac{1}{2}''$	6
$\frac{7}{8}''$	15	$2\frac{3}{4}''$	5
$1''$	13	$3''$	5
$1\frac{1}{8}''$	12	$3\frac{1}{2}''$	4
$1\frac{1}{4}''$	11	$4''$	4
$1\frac{3}{8}''$	10	$4\frac{1}{2}''$	4
$1\frac{1}{2}$	9	$5''$	3
$1\frac{5}{8}''$	8	$5\frac{1}{2}''$	3
$1\frac{3}{4}''$	8	$6''$	3
$2''$	7		

I understand that this system is to be discontinued and something a little simpler introduced.

On other lines no attention is paid as to the size of the scantlings, the credit side being made up of scantlings, offcuttings, firewood, and sawdust. In some cases ratios for some or all of the above are fixed; the following being some of the ratios in use on various lines :—

Bombay, Baroda and Central India.

The proportion of firewood and sawdust obtained per ton of logs cut is fixed at 1 cwt. and 1½ cwt. respectively.

Serviceable teak scrap is priced at 14 annas per cubic feet. Unserviceable scrap is priced at Rs. 16 per ton. This, however, varies according to the price obtained at auction.

Sawdust is priced at 6 annas per cwt.

Oudh and Rohilkund.

Slabs are priced at half the issue rate for logs, firewood at Rs. 0-4-2, and sawdust Rs. 0 2-1 per cubic feet.

Eastern Bengal.

Offcuttings are taken as being worth Rs. 8-12-0 per ton. Sawdust as worthless.

Bengal-Nagpur.

The credits are made up of firewood and sawdust, both at Rs. 0-2-3 per cubic feet. The firewood stacks contain a certain amount of small stuff that is serviceable if a use can be found for it. In the case of any of this being used, it is taken to credit as serviceable offcuttings at Rs. 50 per ton.

This is, I think, the best method of dealing with this class of material, as if stocked as serviceable offcuttings, it is liable to accumulate; and a time comes when, although as individual pieces they are serviceable, as a whole quantity they are not, and a big adjustment is necessitated; while under this latter system they are considered to be scrap until proved serviceable, only requiring an additional entry in the credit side of the timber account.

On most lines, the Superintendents informed me that they were forced to use, more or less, green timber, as they were unable to get a sufficient stock of timber to really season it. The natural result was visible in many of the carriages.

The final accounts are submitted at various dates after the close of the month: from the 17th of the following month on the East Indian, which time might, by the way, be reduced four days by introducing the system of store accounting in use on the Bombay, Baroda and Central India; to the 15th of the second month, after the close of the month for which the accounts are being submitted.

On the following lines, the cost of repairing each engine is kept separately :—

Bombay, Baroda and Central India,
Great Indian Peninsular,
Indian Midland,
Oudh and Rohilkund,
Bengal and North-Western,
East Indian,
Eastern Bengal,
Bengal-Nagpur,
Southern Maharatta.

On the Rajputana-Malwa each class of engine is kept separately, and the cost of repairs booked to it. The Superintendent told me that he wished to stop this, and book everything direct to the sub-head of abstract B.

On the following lines the repairs of carriages and wagons are booked as shown opposite each :—

Railway.	Carriages	Wagons.
Rajputana-Malwa	... Classes	Classes.
Indian Midland	... Classes	Classes.
Oudh and Rohilkund ...	... Classes	Classes.
Bengal-Nagpur	... Classes	Classes.
Southern Mahratta... ...	... Classes	Goods.
Bengal and North-Western ...	... Coaching	Goods.
Eastern Bengal ...	... Coaching	Goods.
South Indian	... Coaching	Goods.

The cost of all repairs and stores issued to each engine is kept on many lines in the Engine Ledger. The form in use on the Indian Midland is most convenient.

On comparatively few lines do Drivers fill in the times of arrival and departure for each station; the usual practice is to enter only big junctions, and the time of starting and finishing work on the ticket.

On the Great Indian Peninsular a quarterly analysis of the cost of working for each district is prepared and printed. On the Southern Mahratta similar statements for each Foreman's division are prepared monthly. These are very valuable, and entail very little extra work in the accounting.

Generally speaking, all cooly labour, that possibly can be, is allocated; the remainder, together with steam charges, and any other charges that cannot be allocated, are distributed over the works being carried out in the shop, in proportion to the cost of labour allocated to each work.

In very few works, is any work undertaken until an estimate in detail has been prepared, and where this rule is in force, nothing is done until the estimate has been passed and a work order issued.

These estimates are prepared by the Workshop Superintendent, or Manager, on those lines that have such an official; on others by the Assistant in charge of the shops, in consultation with the Foremen.

In almost all of the shops visited the men receive their pay in tin boxes; this expedites the work of payment very considerably. I did not learn that any other line follows the practice of the South Indian, of paying the money into each man's hand. Generally speaking all the labour in all of the works is daily paid, I heard of very few workmen on monthly pay. This of course simplifies the accounts immensely, as the men's pay is calculated, in very many cases, on the same sheet as their time is taken. The leave rules for these men are on most lines, "No work, no pay."

Special tools and shop arrangements.

On most lines a considerable amount of sheet metal working plant has been laid down, and on many of them all Tinsmiths' work is made in the shops, none whatever being purchased. Standard patterns of lamps, lanterns, &c., have been fixed on, and these are manufactured very quickly and cheaply.

The undermentioned machines were particularly noticeable as doing work rapidly and cheaply:—

Vertical hydraulic wheel presses on the Rajputana-Malwa Railway, by Sir Joseph Whitworth and Company.

Lapping machines on the Indian Midland Railway, Oudh and Rohilkund Railway, East Indian Railway, by Beyer and Peacock.

Copper stay rolling, centreing, squaring, and chasing machines on the Indian Midland Railway, Oudh and Rohilkund Railway, East Indian Railway, by different makers.

Spring-making machine on the Oudh and Rohilkund Railway, by Ibbitson of Sheffield.

Spring-testing machine on the Indian Midland Railway, by Bailey of Salford.

Four spindle-boring machine, for axle boxes on the East Indian Railway.

Hydraulic rivetting machinery on the East Indian Railway and Eastern Bengal State Railway.

Brass-polishing machines on the Bombay, Baroda and Central India and Great Indian Peninsular Railways, made locally.

Brass-boring magnetting machine on the Great Indian Peninsular Railway, by Selig Sonnenthal.

On most lines all finishing work on brass, and other valuable metals is done in a specially enclosed shop, so as to avoid theft; and admission except on business is strictly forbidden.

In many of the workshops there is a well fitted gauge and tool room in which all tools are made, repaired, and kept, and from which they are issued to the workmen, who are not allowed to grind tools themselves, thus saving a great deal of the time usually spent by highly paid labour in doing this work.

A gauge room is considered an absolute necessity where first class work, to standard sizes, has to be turned out.

On many lines the Locomotive Superintendent has a staff of masons, bricklayers, &c., who do all necessary repairs to workshop buildings, put in foundations for machinery, build furnaces, &c.; this is found to be a great convenience, and a saving of much time.

Venetian shutters and windows.

The practice with regard to the above varies very considerably on different Railways.

Some Superintendents put the shutter inside and the glass outside, some reverse this; some slide the shutter up, and the glass down, to open them, or *vice versâ*; some put both up, or both down.

On all lines but the South Indian, the shutter and the window move in separate grooves, so that both can be closed at the same time.

There are many arguments in favour of, and against, the various arrangements.

The general ideas in regard to this matter are as follows:—

i. When the window is closed, there should be no opening in the waist rail outside the window for rain water to fall down between the outside panel, and inner casing.

ii. When a carriage is empty, the glass window should be closed to keep out dust, and possible rain, and the shutter should be capable of being closed outside the window to avoid the breakage of the glass from stones thrown at the train.

If the first requirement is complied with in a carriage in which both the window and the shutter are lowered when open, it is impossible to comply with the second, as the venetian would be inside: this arrangement with the venetian inside has the additional drawback that if it starts to rain while the venetian is closed, and a passenger wishes to close the window, he must open the venetian before he is able to carry out his intention, and his bedding is likely to be well soaked before he has finished.

Both requirements can be met by sliding both the shutter and the window up, but this arrangement is very uncomfortable for a passenger in the top berth in hot weather, as all ventilation is stopped by the glass.

From the above it would appear that the correct practice is to place the shutter outside, and slide it upwards to open it, and put the glass window inside and slide it down to open it.

This method of course gives a much stronger waist rail.

ROLLING STOCK AND FITTINGS.

On the Rajputána-Malwa Railway a lot of the bogie wagons have been fitted with brakes worked with a handwheel from the floor of the wagon. On heavy inclines, brakesmen travel on these wagons on the down hill journey, thus enabling very much heavier loads to be taken.

Adler's patent bogies are in use on this line, and are said to be giving very good results as to steady running and lightness of repairs.

On the Bengal and North-Western Railway full advantage is taken of the enhanced axle load, almost all of the covered goods wagons on this line are marked to carry ten tons.

A new type of underframe is in use on this line, they are 30 feet long, the end pairs of wheels are fitted with ordinary axle guards and boxes, the centre pair of wheels is fitted with axle boxes having 2½" play in the axle guards, and all the springs hang at each end on what is practically a chain of four links. The top link is a shackle taking on to the end of the top spring plate, the next link is an ordinary open chain link 4" or 5" long, the third link is an eye bolt with a nut and washer plate at the bottom, the fourth link is an india-rubber washer, placed between the bottom of the pedestal fixed on to the bottom of the sole bar and washer plate on the eye bolt.

There are thus four points at which flexure can take place.

These frames have been found to run very well indeed, deliberate attempts were made to derail one of them on a 300 feet curve, but nothing short of elevating the inner rail of the curve would do it.

On the East Indian Railway a lot of carriages have been built with the side and end pillars fixed on to the bottom sides with iron straps, instead of their being tenoned into the bottom sides, this gives an open space at the bottom, and saves the sheet iron panels very considerably, as where the space between the sheet iron panel and the inner casing is closed at the bottom, the panels have invariably rusted through.

A very neat arrangement of commode pan has been fitted to some of the officers' carriages. The ordinary enamelled tube is fixed to the floor of the carriage, but at the bottom a trap door, opening downwards, and worked by a handle in the bathroom, is fitted, this is used in connection with a box of sand to avoid fouling, and completely avoids the unpleasant draught upward, which is often experienced when travelling at any speed.

On the Eastern Bengal State Railway a lot of earthenware commode pans are used in the bathrooms of carriages. They are easily cleaned, and are said to give no trouble by breakage, but are very heavy.

On the metre gauge section of this line a lot of 25 feet frames on six wheels are running, the centre pair of wheels have no flanges, and are about 8½" wide, they run very steadily.

First class double saloons built on these underframes are arranged in all ways like the ordinary broad gauge carriages, with a bathroom at each end, and a sliding partition door in the middle.

A neat form of bottom door catch is in use on the Bengal-Nagpur Railway, it is practically self-closing, allows the door to be slammed, and is very cheap.

On this line a good form of top berth is in use, it folds very close to the roof of the carriage, is very rigid when lowered, and is fastened with a very secure self-closing latch.

On the Bombay, Baroda and Central Indian Railway what is known as the "Trinal water closet" is fitted to some of the carriages, it is a very nice fitting but rather heavy. A very neat form of folding button for window straps is in use.

A new form of door for iron covered goods wagons was being fitted on this line as an experiment, the doors were made of sheet iron with two corrugations running diagonally across, almost up to the corners, the edges are flanged over so as to lap over the angle irons fixed round the opening. It was expected that this would make the doors quite watertight, and reduce the cost of maintenance.

PAINTING.

On comparatively few of the lines visited is any of the coaching stock painted at out-stations, even on the Great Indian Peninsular, where there are large carriage repairing shops at some of the out-stations, 1st and 2nd class carriages are never painted anywhere but at the central shops at Parel.

The paint on these vehicles is said to last for, from two to three years.

On the Rajputana-Malwa, the Locomotive Superintendent makes no attempt to finish off the engines elaborately as far as painting is concerned, as he himself puts it he "simply dabs them over with black." This is of course very cheap.

On the Indian Midland also the engines are painted black; to lighten the effect of this, the engine and tender is, so to speak, lined out with zinc bands, about 1¼" wide $\frac{1}{16}$" thick. This never tarnishes, is very cheap, and certainly looks smart. The cost was said to be about Rs. 60 per engine (broad gauge) and it lasts practically as long as the engine.

On the Oudh and Rohilkund almost all painted work is treated by a method devised by the present Locomotive Superintendent of the Bengal and North-Western Railway.

It consists in submitting the painted article, after each coat has been applied, to a temperature of 118° Fahrenheit for a period of about 18 hours; this is done in specially constructed stoves.

The results appear to be wonderfully good; green paint, which seldom lasts for more than two or three years, after rubbing down and varnishing appeared as good as new at the end of five; vermillion, which usually bleaches in from six to nine months, was quite good at the end of two years. The system has been under trial for about seven years, and I was shown some panels painted both white and yellow, that had been among the first to be treated, and which are in very fair condition now.

The Locomotive Superintendent of the Bengal and North-Western is working this himself, and has erected a stove to take a single unit coach, which he runs in bodily after each coat of paint.

This system is said to be of especial value in the monsoon, and should be of great advantage in a moist climate like that of Negapatam.

On a great many lines, the insides of 1st and 2nd class carriages are French polished. This certainly looks much smarter, and I was told that on the Great Indian Peninsular it was found to be cheaper than varnish.

On the Metre Gauge section of the Eastern Bengal I was informed that the paint on 1st and 2nd class carriages lasted about two years. Third class carriages are also painted about every two years, goods stock about every three years.

R. A. BELL,
Assistant Loco. & Carr. Supt.,
South Indian Railway.

NEGAPATAM,
17*th March* 1897.

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NOTE.—*In many of the shops included in this statement work that does not appear under the figures given is done, such as the repairs to iron covered goods wagons, done in many of the Boiler Shops.*

The Locomotive shops of the East Indian Railway are a large manufacturing concern, repairs to Locomotives being but a small part of the work done, and this applies in less degree to some of the shops on other Railways.

QUESTIONS A & B.

Number.	Name of Railway and Department.	B. B. & C. I. Ry.	G. I. P. Ry.	I. M. Ry.	O. & R. Ry.	E. I. Ry., Loco.	E. I. Ry., C. & W.	E. B. Ry., Broad.	B. N. Ry.	R. M. Ry., Loco.	R. M. Ry., C. & W.	B. & N. W. Ry.	E. B. Ry., Metre.	S. M. Ry.	S. I. Ry.
	Iron Foundry.														
1	Floor area in square yards	1,789	2,004	711	856	8,889	.....	484	46	1,100	.....	303	.....	1,307	429
2	Number of Moulders and Coremakers	105	49	48	86	1,200	.....	112	14	68	.....	26	.....	50	123
3	Outturn per annum in tons	1,560	498	185	4,980	17,414	.....	859·20	108	420	.....	93	.....	247·32	247·80
4	Do do do per sq. yd. of floor..	0·91	0·25	0·26	5·82	1·96	.....	1·77	2·67	0·38	.....	0·31	.....	0·19	0·58
5	Do do do do Moulder and Coremaker	14·86	10·16	3·85	57·91	14·51	.....	7·67	7·71	6·06	.....	3·58	.....	8·24	2·47
6	Sq. yd. of floor area per Moulder and Coremaker	15·29	40·90	14 80	9·95	7·41	.....	4·32	2·19	16·17	.....	11·65	.....	43·55	3·49
	Brass Foundry.														
7	Floor area in square yards	..... †	711	266	412	.....	.....	27	..... †	275	196	120	102	..... †	..... †
8	Number of Moulders and Coremakers	12	33	24	16	60	.....	8	7	24	22	11	9	28	..... †
9	Outturn per annum in tons	72	159·60	46	81	151	.....	24·60	15	84	42	18	15·90	65·76	56·45
10	Do do do per sq. yd. of floor...	..... †	0·28	0·17	0·20	.....	.....	0·90	..... †	0·31	0·21	0·15	0·16	..... †	..... †
11	Do do do do Moulder and Coremaker	6	4·84	1·92	5·06	2·40	.....	3·05	2·14	3·50	1·99	1·64	1·76	2·35	..... †
12	Sq. yds. of floor area per Moulder and Coremaker	..... †	21·55	11·08	25·75	.....	.....	3·37	..... †	11·45	8·90	10·90	11·30	..... †	..... †
	Pattern Shop.														
13	Number of Patternmakers	8	12	6	12	50	.....	7	6	7	2	3	2	15	9
14	Do Moulders and Coremakers per Pattern-maker	14·63	6·83	12	8·50	24	.....	17·14	3·50	13·14	11	12·33	4·50	3·86	13 60
	Smith's Shop.														
15	Number of fires	82	148	44	78	125	50	51	34	77	58	50	24	54	86
16	Do hands in the shop	276	592	108	198	500	186	132	35	380	200	124	72	155	322
17	Outturn per annum in tons. New work and repairs	.....	175·80	100	552	2,200	546	240·10	.....	432	598·80	222	27·30	.....	235·98
18	Outturn per annum in tons per fire	.....	1·19	2·27	7·08	17·60	10·92	4·70	.....	5·61	10·32	4·44	1·14	.....	2·74
19	Do do do man	.....	0·29	0·93	2·78	4·40	2·93	1·82	.....	1·14	2·99	1·78	0·38	.....	0·73
20	Number of hands per fire	3·37	4	2·45	2·54	4	3·72	2·59	1·03	4·94	3·45	2·48	3	2·67	3·74
21	Do springs made and repaired per annum	.....	7884 & 4152 spiral	.....	.....	.....	.....	.....	.....	2,568	.....	.....	.....	.....	1,740
22	Do hands employed on spring work ...	.....	.....	.....	.....	.....	.....	.....	.....	40	.....	.....	.....	.....	59
23	Do springs per man per annum	.....	.....	.....	.....	.....	.....	.....	.....	64·20	.....	.....	.....	.....	29 49
	Boiler Shop.														
24	Number of boilers in shop at one time	.....	73	10	26	26	.....	7	1	70	.....	7	4	25	14
25	Do do repaired per annum ...	.....	120	30	40	100	.....	13	2	130	.....	30	32	65	44
26	Average length of stop in the shop in weeks ...	.....	31·63	17·33	33·80	13·52	.....	28	26	28	.....	12·13	6·50	20	22·16
27	Number of hands in the shop	250	287	148	185	760	.....	216	149	410	.....	60	82	200	272
28	Do do per boiler in the shop ...	.....	3·93	14·80	7·12	29·23	.....	30·86	149	5·86	.....	8·57	20·50	8	19·43
29	Do do do repaired per annum.	.....	2·39	4·93	4·63	7·60	.....	16·62	74·50	3·15	.....	2	2·56	3·08	6·18
30	26 × 28 Time in weeks for one man to repair a boiler	.....	124·30	256·48	240·66	395·09	.....	864·08	3,874	164·28	.....	103·95	133·25	160	430·64
	Tinker's & Coppersmith's Shop.														
31	Number of hands in the shop	.....	.....	26	61	100	95	36	27	115	87	12	8	25	54
	Machine Shop.														
32	Number of hands in the shop	300	209	89	163	40 (?)	.....	192	72	161	56	109	74	87	194
33	Do do per engine under repair ...	11·54	2·86	4·45	6·27	.....	.....	14·77	8	1·96	.....	6·32	6·16	2·49	7·46
34	Do do do repaired per annum	5·45	1·74	1·48	4·07	.....	.....	2·74	4	1·24	.....	2·95	1·68	1·26	3·18
35	Do wheel Lathes	5	10	7	.....	.....	17	9	.....	7	7	5	6	6	13
36	Do wheels turned per annum. Pairs...	.....	.....	.....	.....	.....	.....	.....	.....	1,100	4,456	.....	2,484	1,974	2,331
37	Do wheels turned per Lathe per annum. Pairs...	.....	.....	.....	.....	.....	.....	.....	.....	157·14	636·57	.....	414	329	166·50

† Included in the Iron Foundry.

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	Fitting Shop.														
38	Number of hands in the shop	.....	.....	186	169	510	444	142	.....	110	301	.....	107	137	146
39	Do do per engine under repair ...	.....	.....	9·30	6·50	6·80	.....	10·92	.....	1·34	.....	.....	8·92	3·91	5·62
40	Do do do repaired per annum...	.....	.....	3·10	4·23	6·99	.....	2·03	.....	0·85	.....	.....	2·43	1·99	2·39
	Engine Erecting Shop.														
41	Total number of engines on the line	167	605	125	166	596	.....	117	118	446	.....	110	72	220	205
42	Do open mileage	636	1,490	1,041	832	1,883	.....	375	855	1,844	.....	756	445	1,556	1,104
43	Number of miles per engine 42÷41	3·81	2·46	8·33	5·01	3·16	.....	3·21	7·25	4·13	.....	6·87	6·18	7·06	5·39
44	Do engines in shop at one time... ...	26	73	20	26	75	.....	13	9	82	.....	17·25	12	35	26
45	Percentage do do do	15·57%	12·07%	16 %	15·66%	12·59%	.....	11·11%	7·62%	18·39 %	.....	15·68%	16·66%	15·91 %	12·68%
46	Number of engines repaired per annum... ...	55	120	60	40	73	.....	70	18	130	.....	37	44	69	61
47	Percentage do do do	32·93%	19·83%	48 %	24·10%	12·25%	.....	59·82%	15·24%	29·15%	.....	33·63%	61·1%	31·36%	29·76%
48	Average length of stop in the shop in weeks ...	24·58	31·63	17·30	33·80	53·42	.....	9·66	26	32·80	.....	24·24	14·18	26·38	22·16
49	Number of hands in the shop	225	467	233	254	600	.....	136	135	350	.....	341	93	168	312
50	Do do per engine in the shop ...	8·65	6·27	11·65	9·77	8	.....	10·46	15	4·27	.....	19·76	7·75	4·80	12
51	Do do do repaired per annum.	4·09	3·82	3·88	6·35	8·22	.....	1·94	7·50	2·69	.....	9·22	2·11	2·44	5·12
52	48×50. Time in weeks for one man to repair an engine	212·62	198·22	201·55	330·23	427·36	.....	101·01	390	139·99	.....	478·98	196·53	126·61	265·97
53	Number of hands in Machine, Fitting and Erecting Shops, 32+38+49 ...	555	676	508	586	1,150	.....	500	207	621	.....	450	374	392	652
54	Do do &c., per engine in the shop ...	21·35	9·26	25·40	22·54	16·66	.....	38·46	23	7·57	.....	26·10	31·16	11·2	25·08
55	Do do repaired per annum...	10·09	5·63	8·47	14·65	15·75	.....	7·14	11·50	4·77	.....	12·16	8·50	5·68	10·68
56	48×54. Time in weeks for one man to repair an engine	484·68	292·89	439·42	761·85	889·98	.....	371·40	598	248·39	.....	632·35	441·85	295·42	555·78
57	Number of hands in Fitting and Erecting Shops, 38+49	.....	.....	419	423	1,110	.....	278	.....	460	.....	.....	200	305	458
58	Do do &c., per engine in the shop ...	.....	.....	20·95	16·27	14·80	.....	21·38	.....	5·60	.....	.....	16·60	8·71	17·62
59	Do do repaired per annum...	.....	.....	6·98	10·58	15·20	.....	3·97	.....	3·54	.....	.....	4·54	4·42	7·51
60	48×58. Time in weeks for one man to repair an engine	.....	.....	362·44	549·93	790·62	.....	206·47	.....	183·68	.....	.....	236·38	229·85	390·42
	Sawmill.														
61	Number of hands in the shop	.....	84	30	40	.....	138	44	9	.....	85	31	16	33	98
62	Tonnage of timber cut per annum	.....	2,094	263	431·25	.....	635	276	74	.....	2,390	199	139·20	504	612
63	Do. do. do. hand per annum ...	.....	24·93	8·76	10·78	.....	4·60	6·27	8·22	.....	28·12	6·42	8·70	15·27	6·25
	Carriage Building and Repair Shop.														
64	Total coaching stock on the line	475	1,786	422	516	.....	1,371	463	316	.....	1,645	356	325	903	1,171
65	Number of coaching vehicles per mile	0·75	1·20	0·41	0·62	.....	0·73	1·23	0·37	.....	0·89	0·47	0·73	0·58	1·06
66	Do carriages in shop at one time... ...	54	71	45	83	.....	102	31·60	32	.....	166·72	37	57	80	191
67	Percentage do do do	11·39 %	3·98%	10·66%	16·09 %	.....	7·44%	6·83%	10·13%	.....	10·14%	10·39%	17·54%	8·86%	16·31%
68	Number of carriages repaired and turned out per annum	369	490	227	322	.....	2,932	219	284	.....	4,148	119	290	618	531
69	Percentage do do do ...	77·68%	27·44%	53·79%	62·40 %	.....	213·79%	47·30%	89·87%	.....	252·16 %	33·44%	89·23°/₀	68·44%	45·35%
70	Average length of stop in the shop in weeks ...	7·61	7·53	10·31	13·40	.....	1·81	7·50	5·86	.....	2·09	16·17	10·22	6·73	18·70
71	Number of hands in the shop	360	380	199	265	.....	301	68	158	.....	452	140	37	137	593
72	Do do per carriage in the shop ...	6·60	5·35	4·42	3·19	.....	2·95	2·15	4·94	.....	2·11	3·79	0·65	1·71	3·10
73	Do do do repaired per annum-	0·98	0·78	0·88	0·82	.....	0·10	0·31	0·56	.....	0·11	1·18	0·13	0·22	1·12
74	70×72. Time in weeks for one man to repair a carriage	50·23	40·32	45·56	42·79	.....	4·34	16·13	28·93	.....	2·32	61·20	6·63	11·54	58·05

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	Wagon Building and Repair Shop.														
75	Total goods stock on the line	4,285	7,863	2,144	4,506	.....	10,206	2181	3,515	.....	8,723	2983	1861	4704	3430
76	Number of goods vehicles per mile	6·74	5·28	2·06	5·41	.....	5·42	5·82	4·11	.....	4·73	3·95	4·18	3·03	3·11
77	Do do do in the shop at one time.	218	112	80	85	.....	313	46·50	197	.....	387·69	98	158	220	196
78	Percentage do do do do ...	5·09%	1·42%	3·73 %	1·88 %	.....	3·07 %	2·13 %	5·60 %	.....	4·44 %	3·29 %	8·49 %	4·68 %	5·71%
79	Number do do repaired and turned out per annum...	1,376	2,277	1,230	540	.....	11,962	706	514	.....	11,402	669	785	771	355
80	Percentage do do do do ...	32·11%	28·96%	57·37 %	11·98 %	.....	117·21%	32·37 %	14·62 %	.....	130·71 %	22·43 %	42·18 %	16·39 %	10·35%
81	Average length of stop in the shop in weeks ...	8·24	2·56	3·38	8·41	.....	1·36	3·48	19·93	.....	1·77	7·62	10·47	14·84	28·71
82	Number of hands in the shop	.....	168	77	101	.....	368	101	191	.....	633	371	191	62	179
83	Do do per wagon in the shop ...	.....	1·50	0·96	1·19	.....	1·18	2·17	0·97	.....	1·63	3·79	0·64	0·28	0·91
84	Do do do repaired per annum.	.....	0·07	0·06	0·19	.....	0·03	0·14	3·72	.....	0·06	0·55	0·13	0·08	0·50
85	81 × 83. Time in weeks for one man to repair a wagon	.....	3·84	3·26	9·99	.....	1·60	7·56	19·33	.....	0·10	28·73	6·69	3·38	26·21
86	66+77. Number of vehicles in shops at one time.	272	183	125	168	.....	415	78·10	229	.....	554·41	135	215	300	387
87	Percentage do do do ...	5·71%	1·90%	4·87 %	3·35 %	.....	3·59%	2·95 %	5·98 %	.....	5·35 %	4·04 %	9·83 %	5·35 %	8·41%
88	68+79. Number of do repaired per annum...	1,745	2,767	1,457	862	.....	14,894	925	798	.....	15,550	788	1,075	1,389	886
89	Percentage do do do ...	36·66%	28·68%	56·78 %	17·16 %	.....	128·66%	34·98 %	20·83 %	.....	149·98 %	23·60 %	49·15 %	24·77 %	19·26%
90	Average length of stop in the shops in weeks ...	8·11	3·44	5·53	10·18	.....	1·45	4·39	14·92	.....	1·85	8·91	10·40	11·23	23·95
91	71+82. Number of hands in the shops	360	548	276	366	.....	669	169	349	.....	1,085	511	138	199	772
92	Number of hands per vehicle in the shops ...	1·32	2·99	2·21	2·19	.....	1·61	2·16	1·52	.....	1·96	3·79	0·64	0·66	1·99
93	Do do do repaired per annum...	0·16	0·20	0·19	0·42	.....	0·05	0·18	0·44	.....	0·07	0·65	0·13	0·14	0·87
94	90 × 92. Time in weeks for one man to repair a vehicle	10·73	10·30	12·21	22·30	.....	2·33	9·50	22·73	.....	3·63	33·72	6·67	7·45	47·76
	Paint Shop.														
95	Number of vehicles in shop at one time... ...	.....	53	30	20	.....	80	31·60	22	80	89	.....	.....	300	25
96	Do do painted per annum... ...	.....	1,712	250	790	.....	1,386	105	514	125	1,006	996	996	1,389	549
97	Do hands in the shop	195	336	140	221	.....	122	196	138	33	209	130	112	18	251
98	Do do per vehicle in the shop ...	.....	6·34	4·66	11·50	.....	1·53	6·20	6·27	0·41	2·35	.....	.....	0·06	10·04
99	Do do do painted per annum	.....	0·20	0·56	0·28	.....	0·09	1·87	0·27	0·26	0·21	0·13	0·11	0·01	0·46
100	Average length of stop in the shops in weeks...	.....	1·61	6·24	1·32	.....	3	15·65	2·23	33·28	4·60	.....	.....	11·23	2·38
101	98 × 100. Time in weeks for one man to paint a vehicle	.....	10·20	29·08	15·13	.....	4·58	97·07	13·96	13·75	10·80	.....	.....	0·67	23·88
102	86+95. Number of vehicles in all the shops at one time	272	236	155	188	.....	495	109·70	251	.....	643·41	135	215	600	412
103	88+96. Number of vehicles repaired per annum	1,745	4,479	1,707	1,652	.....	16,280	1030	1312	.....	16,556	1,784	2,071	2,778	1,435
104	Average length of stop in the shops in weeks ...	8·11	2·74	4·72	5·92	.....	1·58	5·54	9·95	.....	2·02	3·94	5·35	11·23	14·93
105	92+97. Number of hands in the shops ...	555	884	416	587	.....	791	365	487	.....	1,294	641	250	217	1,023
106	Number of hands per vehicle in the shops ...	2·04	3·75	2·68	3·12	.....	1·60	3·33	1·94	.....	2·01	4·75	1·16	0·36	2·48
107	Do do do repaired per annum	.....	.....	0·24	0·36	.....	0·04	0·35	0·37	.....	0·07	0·36	0·12	0·08	0·71
108	104 × 106. Time in weeks for one man to repair a vehicle	16·53	10·27	12·67	18·47	.....	2·53	18·43	19·30	.....	4·06	18·68	6·22	4·07	37·07
109	Number of depôts on line	7	14	8	10	22	.....	4	8	21	.....	10	4	11	13
110	Do Loco. Foreman	5	13	5	9	20	.....	4	6	17	.....	4	3	11	8
111	Do Carriage examining stations	15	32	7	10	.....	24	6	8	.....	21	12	4	20	19
112	Do miles per depôt (Question (M))	90·85	106·40	131·25	83·20	85·60	.....	93·75	106·84	87·80	.....	75·60	111·25	141·16	84·90
113	Do do Loco. Foreman	127·20	114·60	208·20	92·40	94·15	.....	93·75	142·46	108·40	.....	189	148·80	141·16	138
114	Do do Carriage examining station.	42·50	46·56	148·70	83·20	.....	78·46	62·50	106·84	.....	87·80	63	111·25	77·64	58·10
115	From where are stores for workshops drawn. Question (C)...	General Stores.	General Stores.	Under Imprest.	General Stores.	General Stores.	General Stores.	Loco. Stores.	General Stores.	Loco. Stores.	General Stores.	Loco. Stores.	Loco. Stores.	General and Loco. Stores.	General and Loco. Stores.

Number.	Name of Railway and Department.			B. B. & C. I. Ry.	G. I. P. Ry.	I. M. Ry.	O. & R. Ry.	E. I. Ry., Loco.
116	How are specially obtained stores for a large work dealt with. Question		(*D*)...	Kept in Stores.	Kept in Stores.	Charged off.	Kept in Stores.	Kept in Stores.
117	Are serviceable returned stores priced	Do	(*E*)...	Not priced.	No.	No.	Not priced.	No.
118	Who has charge of stocks of fuel.	Do	(*F*)...	Loco. Supt.	Loco. Supt.	Loco. Supt.	Loco. Supt.	Loco. Supt.
119	Are work order ledgers posted daily	Do	(*G*)...	Yes.	Yes.	No.	Yes.	Yes-
120	Does Loco. Supt. keep his own accounts	Do	(*H*)...	Yes.	Yes.	Yes.	Yes.	Yes.
121	Are accounts kept in State Railway Form	Do	(*N*)...	No.	No.	No.	Modified.	No.
122	Are fuel premia paid	Do	(3)...	Yes.	Yes.	Yes.	No.	Yes.
123	Is piecework done in the workshops	Do	(14)...	Yes.	No.	Yes.	Yes.	Yes.

17th March 1897.

E. I. Ry., C. & W.	E. B. Ry., Broad.	B. N. Ry.	R. M. Ry., Loco.	R. M. Ry., C. & W.	B. & N. W. Ry.	E. B. Ry. Metre.	S. M. Ry.	S. I. Ry.
Kept in Stores.	Kept in Stores.	Kept in Stores.	Kept in Stores.	Kept in Stores.	Kept in Stores.	Kept in Stores.	Charged off.	Charged off.
Not priced.	Yes.	Yes.	Yes.	Not priced.	Not priced.	Yes.	Yes.	No.
Colliery Supt.	Loco. Supt.	Loco. Supt.	Loco. Supt.	Loco. Supt.	Loco. Supt.	Loco. Supt.	Loco. Supt.	Loco. Supt.
Yes.	Yes.	Yes.	Yes.	Yes.	No.	Yes.	Yes.	No.
Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	No.
No.	Modified.	Partly.	Modified.	Yes.	No.	Modified.	Partly.	No.
.....	Yes.	No.	Yes.	.....	Yes.	Yes.	No.	No.
Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	No.

R. A. BELL.

Page 3, Question A & B.

APPENDIX A.

Ry.

(*a*) Iron Foundry :—

1. Floor area.
2. Number, and capacity of Cupolas.
3. ,, of Moulders.
4. ,, of Coremakers.
5. Size of Corestoves.
6. Tonnage of outturn for Loco.
7. ,, ,, ,, ,, Carr. and Wagon.
8. ,, ,, ,, ,, Others.

(*b*) Brass Foundry :—

1. Floor area.
2. Number of Furnaces.
3. ,, of Moulders.
4. ,, of Coremakers.
5. Size of Corestoves.
6. Tonnage of outturn for Loco.
7. ,, ,, ,, ,, Carr. and Wagon.
8. ,, ,, ,, ,, Others.

(*c*) Pattern Shop :—

1. Number of hands.

(*d*) Smith's Shop :—

1. Number of fires.
2. ,, of hands.
3. List of machinery.
4. Tonnage of outturn.

(*e*) Machine Shop :—

1. List of machinery.
2. Number of hands.

(*f*) Erecting Shop (Engine) :—

1. Number of engines in shop at one time.
2. ,, of hands.
3. Average duration of stop in the shop.
4. Number turned out per annum.

APPENDIX A.—(*continued.*)

(*g*) Boiler Shop:—

1. Number of boilers in shop at one time.
2. ,, of hands.
3. ,, of boilers turned out per annum.
4. List of machinery.

(*h*) Carriage Building and Repair Shop:—

1. Number of carriages in shop at one time.
2. ,, of hands.
3. ,, of carriages turned out per annum.

(*j*) Wagon Building and Repair Shop:—

1. Number of wagons in shop at one time.
2. ,, of hands.
3. ,, of wagons turned out per annum.

(*k*) Paint Shop:—

1. Number of vehicles in shop at one time.
2. ,, of hands.
3. ,, of vehicles turned out per annum.

(*l*) Sawmill Shop:—

1. Number of hands.
2. List of machinery.
3. Tonnage of outturn.

(*m*) Tinker's and Coppersmith's Shop:—

1. Number of hands.
2. List of machinery.

(*n*) Fitting Shop:—

1. Number of hands.

Total miles open.

Total No. of Engines.

,, ,, of Carriages.

,, ,, of Wagons.

Number of Depôts on the line.

The above information is required for the purpose of answering the following two questions:—

I.

The extent of the accommodation given in the different shops in terms of some convenient unit of the work done in them.

II.

The proportionate number of units so provided for in relation to the total number of units on the railway.

Any additional information not directly asked for in the above questions, but which will tend to greater completeness of the answers, will be highly valued.

Page 3, Questions A & B.

APPENDIX B.

BOMBAY, BARODA AND CENTRAL INDIA RAILWAY.

(*a*) Iron Foundry:—

1. Floor area. 16,100 square feet.
2. Number, and capacity of Cupolas. Three aggregate capacity 5½ tons per hour.
3. ,, of Moulders. } 105
4. ,, of Coremakers. }
5. Size of Corestoves. 1. 28 feet × 16 feet. 1. 20 feet × 9 feet.
6. Tonnage of outturn for Loco. } 5 tons per day, 130 tons per month.
7. ,, ,, ,, ,, Carr. and Wagon. }
8. ,, ,, ,, ,, Others.

(*b*) Brass Foundry:—

1. Floor area. Included in (*a*) 1.
2. Number of Furnaces.
3. ,, of Moulders. } 12.
4. ,, of Coremakers. }
5. Size of Corestove. 8 feet × 5 feet.
6. Tonnage of outturn for Loco. } 5 to 7 tons per month.
7. ,, ,, ,, ,, Carr. and Wagon. }
8. ,, ,, ,, ,, Others.

(*c*) Pattern Shop:—

1. Number of hands. 8.

(*d*) Smith's Shop:—

1. Number of fires. 87, including, 1 tyre, 2 spring and 2 faggoting furnaces.
2. ,, of hands. 276.
3. List of machinery. ... ... List attached.
4. Tonnage of outturn. ... ... Not available.

(*e*) Machine Shop:—

1. List of machinery. ... ... List attached.
2. Number of hands. 300

(*f*) Erecting Shop (Engine):—

1. Number of engines in shop at one time. 26
2. ,, of hands. 225
3. Average duration of stop in the shop. ... Not available.
4. Number turned out per annum. 55

APPENDIX B.—(*continued.*)

(*g*) Boiler Shop:—

1.	Number of boilers in shop at one time.	——
2.	„ of hands.	250
3.	„ of boilers turned out per annum. ...	Not available.
4.	List of machinery.	List attached.

(*h*) Carriage Building and Repair Shop:—

1.	Number of carriages in shop at one time.	54
2.	„ of hands.	360
3.	„ of carriages turned out per annum.... ...	369

(*j*) Wagon building and repair shop:—

1.	Number of wagons in shop at one time.	218
2.	„ of hands.	Included in (*h*) 2
3.	„ of wagons turned out per annum.	1,376

(*k*) Paint Shop:—

1.	Number of vehicles in shop at one time.	——
2.	„ of hands.	195
3.	„ of vehicles turned out per annum.	——
Total miles open.		636
„ No. of Engines.		167
„ „ of Carriages.		475
„ „ of Wagons.		4,285

(*d*) Smith's Shop:—

Steam hammers.	8
Shearing machines.	2
Spring testing machines.	2
Bolt and nut making machines.	2
Rolling mill.	1
Swageing machines.	1

(*e*) Machine Shop:—

Lathes, engine wheel.	5
Do carr. and wagon wheel.	5
Do do do Journal.	2
Do tyre boring.	2
Do screw cutting.	22
Do axle box brass boring....	2
Do capstan.	6
Do gap.	1
Do lapping.	2
Do slide rest.	2

APPENDIX B.—(*continued.*)

Lathes three headed stud and bolt.	1
Do centre for wheel.	2
Machines screwing.	7
Do three spindle nut tapping.	1
Do planing.	5
Do milling.	4
Do slotting.	5
Do shaping 1 with 3 heads.	3
Do double headed nut shaping.	1
Do slot drilling.	1
Machine double spindle, brass boring.	1
Do drilling.	11
Do do radial	3
Do cylinder boring.	1
Do universal grinding.	1
Do patent grinding.	1
Do emery polishing.	2
Do metal sawing.	1
Do crank pin turning.	1
Do centreing.	1
Do pipe testing.	1
Do safety valve testing.	1
Do oil extracting.	1
Wheel presses.	2
Fly press.	1
Travelling cranes.	2
Stands with 4 emery wheels.	2
Double grindstone troughs.	2
Hand crane.	1
Large grinding stones.	2

(*g*) Boiler Shop—

Punching and shearing machines.	4
Drilling machines.	3
Small pressing machine.	1
Plate bending machines.	3
Tube cutting machine.	1
Do cleaning do.	1
Do testing do.	1
Planing machine.	1
Sawing do.	1
Smiths' forge.	1
Circular forge.	1
Crane.	1

APPENDIX B.—(*continued.*)

GREAT INDIAN PENINSULA RAILWAY.

(*a*) Iron Foundry—

1.	Floor Area.		2,004 square yards.
2.	Number and capacity of Cupolas.		2 of 2 tons each; 1 of 1 ton.
3.	Number of Moulders.	Moulders	19
		do Assistants	18
4.	Number of Coremakers.	do Apprentices	12
5.	Size of Corestoves.		Length 32′, Breadth 12′, Height 10′.
6.	Tonnage of outturn for Loco.		Average 41·5 tons per month.
7.	,, ,, ,, Carr. and Wagon.		
8.	,, ,, ,, Others.		

(*b*) Brass Foundry—

1.	Floor area.		711 square yards.
2.	Number of Furnaces.		8
3.	Number of Moulders	Moulders	8
		do Assistants	16
4.	Number of Coremakers.	do Apprentices	9
5.	Size of Corestoves.		Length 21′, Breadth 8′, Height 8′.
6.	Tonnage of outturn for Loco.		tons cwt.
7.	,, ,, ,, Carr. and Wagon.		Average 13—12 per month.
8.	,, ,, ,, Others.		

(*c*) Pattern Shop—

1.	Number of hands.		12

(*d*) Smiths' Shop—

1.	Number of fires.	Smiths' fires	148
		Blast furnaces	7
		Fagoting furnaces	2
		Spring furnaces	3
2.	Number of hands.	Fitters	5
		,, Assistants	2
		Smiths and Springmakers	138
		,, ,, Assistants	61
		,, ,, Apprentices	91
		Strikers	288
		Machinemen	1
		,, Assistants	6
3.	List of machinery.		List attached.
4.	Tonnage of outturn.		Average tons 14, cwt. 18 per month.
			Engine and tender springs. 84 per month.
			Carriage and wagon ,, 573 ,,
			Spiral springs ,, 346 ,,

APPENDIX B.—(*continued.*)

(*e*) Machine Shop—

1.	List of Machinery.		List attached.
2.	Number of hands.	Fitters.	12
		,, Assistants	4
		Machinemen.	37
		,, Assistants.	77
		,, Apprentices	74
		Chargemen.	5

(*f*) Erecting Shop (Engine)—

1.	Number of engines in shop at one time.		73
2.	Number of hands.	Fitters.	259
		,, Assistants.	109
		,, Apprentices.	99
3.	Average duration of stop in shop.		7 months.
4.	Number turned out per annum.		120

(*g*) Boiler Shop—

1.	Number of boilers in shop at one time.		73
2.	Number of hands.	Fitters.	1
		Boilermakers.	102
		,, Assistants.	67
		,, Apprentices.	83
		Blacksmiths.	6
		,, Assistants.	2
		Strikers.	18
		Assistant Machinemen.	8
3.	Number of boilers turned out per annum.		120
4.	List of machinery.		List attached.

(*h*) Carriage Building and Repair Shop:—

1.	Number of carriages in shop at one time.	Building.	23	
		Repairing.	48	
2.	Number of hands.	Chargemen.	7	Carriage Building Shop.
		Carpenters.	140	
		,, Assistants.	44	
		,, Apprentices.	39	
		Chargemen.	6	Carriage Repairing Shop.
		Carpenters.	123	
		,, Assistants.	6	
		,, Apprentices.	15	
3.	Number of carriages turned out per annum.	101 carriages.		Built.
		9 wagons.		
		389 carriages repaired.		

APPENDIX B.—(*continued.*)

(*j*) Wagon Building and Repair Shop—

1. Number of wagons in shop at one time.			112
2. Number of hands.	Chargemen.		6
	Carpenters.		130
	Assistants.		20
	Apprentices.		12
3. Number of wagons turned out per annum.			2,277

(*h*) Paint Shop—

1. Number of vehicles in shop at one time.	Carriages.	53
	Engines and Tenders.	10
2. Number of hands.	Painters.	67
	„ Assistants.	240
	„ Apprentices.	29
3. Number of vehicles turned out per annum.	Coaching.	458
	Goods.	1,254
	Engines and Tenders.	98

(*l*) Sawmill—

1. Number of hands.	Machinemen.	8
	„ Assistants.	45
	„ Apprentices.	4
	Chargemen.	4
	Sawyers.	15
	„ Assistants.	8
2. List of machinery		List attached.
3. Tonnage of outturn.	Teak Logs.	Tons 1,526
	„ boards.	„ 228
	Hardwood „	„ 340
	Total miles open.	1,490
	„ Number of Engines.	605
	„ „ „ Carriages.	1,786
	„ „ „ Wagons.	7,863

(*d*) Smiths' Shop—

Steam hammers.	14
Hand crane, travelling.	3
Smiths' cranes, fixed.	21
Punching machine.	1
Punching and shearing machine.	1
Spring punching and shearing machine.	1

APPENDIX B.—(*continued.*)

Bolt-making machines.	4
Bolt-cutting machine.	1
Steel ferrule rolling machine.	3
Platform weighing machine.	2
Circular saw.	1
Axle straightening lathe.	2
Blast fans.	3
Spring testing machine.	1
Spring plate hand bending machine.	1
Grindstone.	1
Spiral spring setting block.	1

(*e*) Machine Shop—

Crankpin hole boring machine.	1
Axle lathes.	10
Self-acting lathe 24″ centres.	2
„ „ „ 22″ „	1
„ „ „ 21″ „	2
„ „ „ 15″ „	2
„ „ „ 12″ „	8
„ „ „ Gap, 16″ „	1
„ „ „ „ 15″ „	1
Screw-cutting „ 10″ „	9
„ „ „ 9″ „	2
„ „ „ 8½″ „	6
„ „ „ 8″ „	7
„ „ „ 7″ „	6
„ „ „ 6″ „	3
Common hand „ 12″ „	1
„ „ „ 10″ „	2
„ „ „ 8½″ „	1
„ „ „ 7½″ „	1
„ „ „ 7″ „	1
„ „ „ 5″ „	2
Centering „	1
Machine, brass finishing.	1
„ clack ball finishing.	2
„ planing.	11
„ grooving.	3
„ shaping.	11
„ drilling.	26
„ slotting.	13
„ „ cylinder port.	1
„ screwing.	12

APPENDIX B.—(*continued.*)

Machine, nut tapping.	... ...	1
,, nut shaping.	... ...	1
,, nut milling, double, for brass.	... ...	1
,, boring.	... ...	1
,, horizontal boring.	... ...	1
,, band saw for cutting cold metal.	... ...	1
,, band saw sharpener.	... ...	1
,, universal milling.	... ...	1
Copper stay lathe.	... ...	2
Friction crane.	... ...	2
Emery grinders.	... ...	6
Buffing machines.	... ...	2
Grindstone dressing machine.	... .	1
Punching press with tools.	... ...	1
Grindstones.	... ...	6
Twist drill grinder.	... ...	1
Safety valve-testing machine.	... ...	2
Oil-testing machine.	... ...	1
Magnet machine.	... ...	1

(*g*) Boiler Shop :—

Punching and shearing machines.	... ...	4
Plate rollers.	... ...	2
Drilling machines.	... ...	3
Multiple drilling machine.	... ...	1
Plate planing machine.	... ...	1
Tapping machine.	... ...	1
Tube cleaning machine.	... ...	1
Grindstones.	... ...	2
Overhead travelling cranes.	... ...	2
Smiths' forges.	... ...	15
Jib cranes.	... ...	11

(*l*) Sawmill—

Vertical log frame,	39″	... ...			1
,, ,, ,,	32″	... ...			1
,, ,, ,,	30″	... ...			1
Circular saw bench,	40″	... ...			1
,, ,, ,,	38″	... ...			5
,, ,, ,,	36″	... ...			3
,, ,, ,,	30″	... ...			1
,, ,, ,,	24″	... ...			1
,, ,, ,,	20″	... ...			1
,, ,, ,,	18″	... ...			1

APPENDIX B.—(*continued.*)

		...	...	...	1
Band saw,	36″	...	...	...	1
,, ,,	24″	...	...	...	1
,, ,,	20″	...	...	...	1
,, ,, Frame,	24″	...	...	...	4
Planing machines,	24″	...	...	...	1
Moulding ,,	12″	...	...	...	
Morticing and boring machines,	14″	...	...	...	1
,, ,,	13″	...	...	...	1
,, ,,	12″	...	...	...	1
,, ,,	12″	...	...	...	2
Boring machines,	12″	...	...	..	3
Morticing ,,	12″	...	...	...	2
Tenoning ,,	12′	...	...	...	2
,, ,,	6″	...	...	...	1
Drilling ,,	1″	...	...	...	2
Saw sharpening machines	12″	...	...	...	1
Grindstone,	48″	...	...	...	2
Wood turning lathe,	24″	...	...	...	1
Jigger saw,	12″	...	...	...	1
Fly press,	...	...	...	...	2
Timber weighing machine		...	...	...	1
,, testing ,,		...	...	...	1
General joiner,	24″	...	...	...	1
Wood turning lathe,	8″	...	...	...	1

RAJPUTANA–MALWA RAILWAY. (*Locomotive*).

(*a*) Iron Foundry—

1. Floor area.	... ...	...	1,100 square yards.
2. Number and capacity of cupolas.			2 of 9 tons each with English coke.
3. Number of Moulders	...	Men	23
		Boys	10
		Mistry	1
		Dressers, labourers, &c.	30
4. Number of Coremakers	...	... ...	4
		Total hands ...	68
5. Size of corestove.			15·5 feet long by 14 feet wide.
6. Tonnage of outturn for loco.			Average 25 tons per month.

APPENDIX B.—(*continued.*)

7.	Tonnage of outturn for carr. and wagon	Average 10 tons per month.
8.	„ „ others	
	Total average.	„ 35 „ „
	Floor area for dressers....	215 square yards.
	Number of moulding machines.	4
	„ of cranes.	3

Note.—The Foundry is capable of turning out a much larger tonnage when more hands are employed.

(*b*) Brass Foundry—

1.	Floor area.		275 square yards.
2.	Number of furnaces.		4
3.	Number of Moulders.	Mistry. ...	1
		Men. ...	8
		Boys. ...	6
		Dressers, labourers, &c.	7
4.	Number of Coremakers.		2
		Total hands...	24
5.	Size of corestove.		13 feet long by 12 feet wide.
6.	Tonnage of outturn for loco.		Average 6·75 tons per month.
7.	„ „ carr. and wagon	...	Nil.
8.	„ „ others	...	0·25 „ „
		Total...	7 „ „
	Number of moulding machines.	... ...	2
	„ of sand mills.	... ...	1

(*c*) Pattern Shop—

1.	Number of hands.	Mistry.	
		Pattern maker.	1
		Carpenters (for general work).	6
	1 General joiner.	1 Wood turning lathe. 1 Grindstone.	20

(*d*) Smith's Shop—

1.	Number of fires.	Hearths, annular.	3
		„ Smiths'	64
		Fires for bolt making machines.	2
2.	Number of hands.	Mistries.	2
		Smiths.	81
		Strikers.	138
		Boys.	17
		Hammermen.	5
		Labourers, &c.	22
		Total hands ...	265
3.	List of machinery.		List attached.
4.	Tonnage of outturn.	New work monthly, average	22 tons.
		Articles repaired „ „	14 tons.

APPENDIX B.—(*continued.*)

(*e*) Machine Shop—

1.	List of machinery.		List attached
2.	Number of hands.	Mistries.	4
		Turners and Machinemen.	136
		Labourers and Oilers. ...	21
		Total hands ...	161

(*f*) Erecting Shop (Engine)—

1.	Number of engines in shop at one time.		Average 82
2.	Number of hands.	Chargemen, European and Eurasian	11
		„ Native.	9
		Fitters.	200
		Labourers.	110
		Boys.	20
		Total hands ...	350
3.	Average duration of stop in the shop.	..	6 months.
4.	Number turned out per annum.		Average 130

(*g*) Boiler Shop—

1.	Number of boilers in shop at one time.		Average 70
2.	Number of hands.	Chargeman, European and Eurasian.	16
		„ Native.	15
		Men and Boys.	359
		Labourers.	20
		Total hands ...	410
3.	Number of boilers turned out per annum.		Average 130
4.	List of machinery.		List attached.

Note.—In addition to ordinary Boiler repairs this Shop does a lot of work in building tanks, girders, &c., for the Stores and Engineering Department.

(*h*) Paint Shop—

1.	Number of engines in shop at one time.		Average 80
2.	Number of hands.	Mistry.	1
		Painters.	30
		Labourers.	2
		Total hands ...	33
3.	Number of engines turned out per annum.		Average 125

APPENDIX B.—(*continued.*)

(*m*) Tinker's and Coppersmith's Shop—

1. Number of hands.	Coppersmiths.		27
	Tinsmiths.		17
	Tubeman.		26
	Machinemen.		6
	Labourers.		11
	Others, such as Pipe-polishers, Fitters, Painters, Burnishers, &c.		28
		Total hands ...	115
2. List of machinery.			List attached.

(*n*) Fitting Shop—

1. Number of hands.	European and Eurasian Chargemen		2
	,, ,, Asst. ,,		2
	Native Chargemen.		8
	Fitters.		67
	Labourers.		31
		Total hands ...	110

Wheel Shop—

Number of hands.	Chargeman.		1
	Mistries.		3
	Fitters.		41
	Labourers.		18
		Total hands ...	63
Hydraulic wheel presses		... ...	2

Spring and Wheel Tyring Shop—

Number of hands.	Chargeman.		1
	Mistry.		1
	Fitters.		5
	Spring Smiths.		9
	Black Smiths.		8
	Strikers.		23
	Furnace and Tyremen. ...		3
	Labourers.		2
		Total hands ..	52

1 Wall crane, 1 Spring tester, 1 Hydraulic press, 1 Spring furnace, 1 Tyre furnace, 8 Smiths' hearths.

Outturn. 214 Engine and Tender springs per month.
43 Tyres put on per month.

APPENDIX B.—(*continued.*)

Millwrights Shop—

Number of hands.	Mistries.		2
	Fitters.		29
	Enginemen, Firemen, &c. ...		16
	Cobblers.		8
	Masons.		3
	Labourers.		34
	Others.		5
	European Pump Inspector. ...		1
	Fitter.		1
	Labourers.		5
		Total hands ...	104

Brass finishing Shop—

Number of hands.	Mistry.		1
	Brass finishers.		46
	Labourers.		3
		Total hands ...	50

Motion Fitting Shop—

Number of hands.	Mistry.		1
	Fitters.		46
	Labourers.		5
		Total hands ...	52
Labourers gang attached to Loco. Stores.		... ...	52
Total miles open.		...	1844·16
Total number of engines.		... ...	446

(*d*) Smiths' Shop—

Bolt and nut making machines.			2
Punching and shearing machines.			1
Wall cranes.		... ...	4
Fly press.		... ...	1
Hot saw.		... ...	1
Grindstone.		... ...	1
Steam hammer, 15 cwt.		... ...	1
,, ,, 12½ ,, ...		... ...	2
,, ,, 5 ,, ...		... ...	4
,, ,, 3 ,, ...		... ...	1
Scrap furnace		... ..	

APPENDIX B.—*(continued.)*

(*e*) Machine Shop—

Lathes, wheel						7
,, cylinder boring.						1
,, wheel quartering.						1
,, brake gap, 18″ centres						2
,, gap double head, self-acting,			14″			2
,, ,, ,, ,, ,,			13″			1
,, ,, ,, ,, ,,			12″			7
,, ,, single ,, ,,			10″			9
,, ,, ,, ,, ,,			8″			4
,, self-acting			8″			12
,, ,, ,,			6″			14
,, ,, ,,			6″			4
,, ,, ,,			5″			2
,, ,, ,,	double head		6″			1
Machine planing			12′-0″			2
,, ,,			6′-0″			3
,, ,,			4′-0″			2
,, ,,			2′-0″			1
,, ,,			1′-6″			1
,, shaping			12″			1
,, ,,			8″			6
,, ,,			6″			1
,, ,,			4″			2
,, ,,	double headed		4″			2
,, nut shaping.						1
,, slotting.			12″			2
,, ,,			8″			2
,, ,,			7″			1
,, ,,			6″			2
,, slot drilling.						3
,, drilling.						9
,, ,, radial.						7
,, bolt and nut screwing.						4
,, Nut tapping.						2
,, milling....						1
,, lapping.						2
,, emery buffing.						1
Tool grinders universal emery.						3
,, ,, emery for twist drills....						1
,, ,, ,, for milling cutters.						1

Screw cutting.

APPENDIX B.—*(continued.)*

(*g*) Boiler Shop—

Cranes, over head, travelling.			3
Pumps, hydraulic testing.			2
Machines, punching and shearing.			4
,, drilling.			2
,, ,, radial.			3
,, bolt and nut screwing.			2
,, plate bending.			2
Lathes, self-acting and screw cutting, single,	7″		1
,, ,, ,, ,,	6″		1
,, ,, ,, double,	12″		1
,, ,, ,, gap,	8″		1
,, ,, ,, ,,	14″		1
,, ,,	6″		1
,, stay chasing,			1
Grindstone			1

(*m*) Tinkers' and Coppersmiths' Shop—

Machine, grooving, Tinsmiths,	1
,, oil can spout shaping.	1
,, washer cutting.	2
,, burring.	1
,, circle cutting.	1
,, sheet bending.	1
,, tube rimering.	2
,, ,, cutting.	3
Saw, circular, pipe cutting.	1
Tube rumbler.	1
Fly presses...	2
Tube brazing furnaces.	2
Hearths, various.	9
Brazing pots.	8

RAJPUTANA-MALWA RAILWAY.

Carriage and Wagon.

(*b*) Brass Foundry—

1.	Floor area.	1,764 square feet.
2.	Number of furnaces.	2
3.	,, of Moulders.	20
4.	,, of Coremakers.	2
5.	Size of corestove.	$18\frac{3}{4}' \times 10\frac{1}{2}' \times 9'$.
6.	Tonnage of outturn for carriage and wagon.	Tons $3\frac{1}{2}$ per month.

APPENDIX B.—(*continued.*)

(*c*) Pattern Shop—

1. Number of hands...	2

(*d*) Smith's Shop—

1. Number of fires.	584 furnaces.
2. „ of hands.	200
3. List of machinery.	...List attached.
4. Tonnage of outturn.	Tons 598, cwt. 16, qr. 1, lbs. 27 per annum.

(*e*) Machine Shop—

1. List of machinery.	... List attached.
2. Number of hands.	56

(*h*) Carriage Building and Repair Shop—

1. Number of carriages in shop at one time. ...	...166·72
2. „ of hands.	... 452
3. „ of carriages turned out per annum....	... 4,148

(*j*) Wagon Building and Repair Shop—

1. Number of wagons in shop at one time. ...	..387·69
2. „ of hands.	... 633
3. „ of wagons turned out per annum. ...	..11,402

(*k*) Paint Shop—

1. Number of vehicles in shop at one time.	89
2. „ of hands.	209
3. „ of vehicles turned out per annum. ...	... 1,006

(*l*) Saw Mill—

1. Number of hands.	85
2. List of machinery.	... List attached.
3. Tonnage of outturn.	119,487 cubic feet of logs per annum.

(*m*) Tinker's and Coppersmith's Shop—

1. Number of hands.	87
2. List of machinery.	... List attached.

(*n*) Fitting Shop—

1. Number of hands.	301
Total number of carriages 1533 single, and 56 double units	= 1645
„ „ of wagons 5573 „ 1575 „ „	= 8723

(*d*) Smith's Shop—

Steam hammers.	8
Punching and shearing machines.	3
Hot saw.	1

APPENDIX B.—(*continued.*)

... ...	1
Swageing machine.	1
Steam spring tester....	1
Blower.	

(*e*) Machine Shop—

... ...	7
Wheel lathes.	3
Screw cutting lathes...	2
Ordinary lathes.	1
Keyway cutting machines.	1
Shaping machines.	2
Slotting „	13
Drilling „	4
Screwing „	1
Planing „	1
Grindstone for twist drills.	1
„	

(*l*) Saw Mill—

... ...	2
Vertical saw.	1
Crosscut do.	7
Machines, circular, saw.	2
„ morticing.	1
„ tenoning.	1
„ moulding.	4
„ general joiner.	2
„ planing.	1
„ rounding.	1
„ shaping and jigger saw.	2
„ morticing, hand.	4
„ saw sharpening.	1
„ three spindle boring.	2
„ band saw.	4
Wood turning lathes.	2
Grindstones.	1
Lathe for metal. ...	

(*m*) Tinsmith's and Coppersmith's Shop :—

... ...	1
Machine, circular cutting.	1
„ heading.	1
„ folding.	1
„ halving.	1
„ angle bending.	1
„ rolling.	

APPENDIX B.—(*continued.*)

INDIAN MIDLAND RAILWAY.

(*a*) Iron Foundry—

1.	Floor area.	6,400 square feet.
2.	Number and capacity of cupolas.	1, 4 tons.
3.	Number of Moulders.	45 (13 Moulders, 20 Apprentices, 12 Coolies.)
4.	Do of Coremakers.	3
5.	Size of corestove.	16′×11′×8′.
6.	Tonnage of outturn for locomotive.	85 tons per annum.
7.	Do do do do carriage and wagon.	50 do do
8.	Do do do do others.	50 do do

(*b*) Brass Foundry—

1.	Floor area.	2,400 square feet.
2.	Number of furnaces.	2
3.	Do of Moulders.	21 (5 Moulders, 8 Apprentices, 8 Coolies.)
4.	Do of Coremakers.	
5.	Size of corestove.	Nil.
6.	Tonnage of outturn for locomotive.	36 tons per annum.
7.	Do do do carriage and wagon.	5 do do
8.	Do do do others.	5 do do

(*c*) Pattern Shop—

1.	Number of hands.	6

(*d*) Smiths' Shop (includes Spring-making Shops)—

1.	Number of fires	44
2.	Number of hands.	108 (includes hammermen and coolies).
3.	List of machinery.	List attached.
4.	Tonnage of outturn.	100 tons per annum, excluding repairs.

(*e*) Machine Shop—

1.	List of machinery.	List attached.
2.	Number of hands.	89 (including apprentices and coolies.)

(*f*) Erecting Shop—(Engine.)

1.	Number of engines in shop at one time	20
2.	Do of hands.	233 (including apprentices and coolies.)
3.	Average duration of stop in the shop.	4 months.
4.	Number turned out per annum.	60. Heavy and light repairs.

(*g*) Boiler Shop—

1.	Number of boilers in shop at one time.	10
2.	Do of hands.	148 (including apprentices and coolies).
3.	Do of boilers turned out per annum.	30
4.	List of machinery.	List attached.

APPENDIX B.—(*continued.*)

(*h*) Carriage Building and Repair Shop—

1.	Number of carriages in shop at one time.	45
2.	„ of hands.	199
3.	„ of carriages turned out per annum.	227

(*j*) Wagon Building and Repair Shop—

1.	Number of wagons in shop at one time.	80
2.	„ of hands.	77
3.	„ of wagons turned out per annum.	1,230

(*k*) Paint Shop—

1.	Number of vehicles in shop at one time	30
2.	„ of hands	140
3.	„ of vehicles turned out per annum	250

(*l*) Sawmill—

1.	Number of hands.	30
2.	List of machinery.	List attached.
3.	Tonnage of outturn.	263 tons per annum.

(*m*) Tinkers' and Coppersmiths' Shop—

1.	Number of hands.	26
2.	List of machinery.	List attached.

(*n*) Fitting Shop—

1.	Number of hands.	186 (including apprentices and coolies)
	Total miles open.	1040·71
	„ number of engines.	125
	„ „ carriages.	422
	„ „ wagons.	2,144

(*d*) Smiths' Shop—

Machine, shearing and punching.	1
„ swageing.	1
„ bolt making.	1
„ hot saw.	1
Steam hammers, cwt. 30...	1
„ „ „ 10...	2
„ „ „ 5	1
Fagoting furnace.	1
Spring „	1
Machine, spring-testing.	1

APPENDIX B.—(*continued.*)

(*e*) Machine Shop—

Machine, slotting stroke,	13″	1
,, ,, ,,	10″	1
,, ,, ,,	6″	2
Machine, shaping, double ram,	18″	1
,, ,, ,, ,,	14″	1
,, ,, single ,,	15″	1
,, ,, ,, ,,	12″	1
,, ,, ,,	8″	1
,, ,, ,,	6″	1
Lathes S. C.	10″ centres 10′ beds.	4
,,	extra heads and slide rests on above bed. ...	4
,, S. C.	12″ centres 14′ bed.	1
,,	extra head and slide rest on above bed.	1
,, stud	7″ centres 4′—6″ bed.	1
,, S. C.	8″ ,, 10′ ,, ...	1
,, double geared	8″ ,, 11′—6″ ,, ...	1
,,	extra head on above bed.	1
,, S. C.	12″ centres 9′ bed.	2
,,	extra heads and slide rests on above beds. ...	2
,, S. C.	2′ centres 5′—6″ bed.	1
,, ,,	12″ ,, 14′ ,, ...	1
,,	extra head and slide rest on above bed.	1
,,	nut facing.	1
,,	double-headed Stud.	1
,,	copper stay.	1
,,	double geared, 8″ centres 11′ bed.	1
,,	extra head on above bed.	1
,, S. C.	8½″ centres 6′ bed.	2
,, ,,	,, ,, 4′ ,, ...	1
,, ,,	8″ ,, 5′ ,, ...	1
,, ,,	6½″ ,, 5′—6″ bed	2
,, universal.	8″ ,, 2′ ,, ...	1
Machine, drilling.	... ...	4
,, ,,	radial.	2
,, ,,	... ...	7
,,	link motion lapping.	1
,,	planing.	4
,,	motion box grinding...	1
,,	twist drill ,, ...	1
Lathe, universal with grinding attachment.	... ...	1
Machine, emery grinding.	... ...	2
,,	piston rod grinding.	1

APPENDIX B.—(*continued.*)

Machine, grindstone.	... ...	1
,,	polishing.	1
,,	,, with 4 wheels and 2 buffs.	1
,,	emery surface grinding.	2
,,	double geared boring.	1
,,	graving.	1
,,	screwing.	6
,,	milling.	1

WHEEL SHOP.

Lathes, wheel,	5′-6″	2
,, ,,	4′-6″	2
,, ,,	3′-6″	3
,,	double tyre boring.	1
,,	journal turning.	1
,,	axle straightening.	1
Hydraulic press.	... ...	1
Tyre furnace.	... ...	1

(*g*) Boiler Shop—

Plate bending rolls,	4′-6″ × 5¼″	1
,, ,, ,,	6′-0″ × 8″	1
,, ,, ,,	10′-0″ × 14″	1
Stay tappers	... ...	2
Band saw machine.	... ...	1
Machine, drilling radial.	... ...	1
,,	punching and shearing.	2
,,	shearing, hand.	1
,,	punching, hand.	1
,,	flexible drilling.	2
,,	milling for removing burr from tubes.	1

(*l*) Sawmill—

Machine, emery saw sharpening.	... ...	1
,,	band Saw.	1
,,	boring single spindle.	1
,,	shaping.	1
,,	tenoning.	1
,,	morticeing.	1
,,	boring three spindle.	1
,,	horizontal boring and morticeing.	1
,,	general joiner.	2
,,	circular saw bench.	1
,,	drilling.	

APPENDIX B.—(*continued.*)

Machine, moulding, iron grinding.	1
Grindstone....	1
Logmill.	1

(*m*) Tinkers' and Coppersmiths' Shop—

Machine, saw, for cutting tubes.	1
,, drilling	1
,, tube-testing.	1
,, shearing.	1
,, bending.	1
,, beading.	1
,, wiring.	1
,, circle cutting.	1
,, panning down.	1
,, angle bending.	1
,, folding.	1
,, binding.	1
,, straight beading.	1
Tube rollers.	2
Fly press.	1

OUDH AND ROHILKUND RAILWAY.

(*a*) Iron Foundry—

1.	Floor area.	855 square yards 6 square feet.
2.	Number and capacity of Cupolas.	2 of 80 cwt. melting 3 tons per hour. 1 of 40 ,, 1½ ,, ,,
3.	Number of Moulders	68
4.	,, Coremakers	18
5.	Size of corestove.	31 feet long, 12 feet broad, 9 feet high.
6.	Tonnage of outturn for locomotive.	Average, 120 tons per annum.
7.	,, ,, carriage and wagon	,, 180 ,, ,,
8.	,, ,, others.	,, 4,680 ,, ,,

(*b*) Brass Foundry—

1.	Floor area.	412 square yards.
2.	Number of furnaces	3
3.	,, Moulders	15
4.	,, Coremakers	1
5.	Size of corestove	Nil.
6.	Tonnage of outturn for locomotive.	Average 48 tons per annum.
7.	,, ,, carriage and wagon	,, 36 ,, ,,
8.	,, ,, others.	,, 9 ,, ,,

APPENDIX B.—(*continued.*)

(*c*) Pattern Shop—

1.	Number of hands.	12

(*d*) Smiths' Shop :—

1.	Number of fires.	78
2.	,, of hands.	198
3.	List of machinery.	List attached.
4.	Tonnage of outturn.	46 tons per month.

(*e*) Machine Shop—

1.	List of machinery.	List attached.
2.	Number of hands.	163

(*f*) Erecting Shop—(Engine)—

1.	Number of engines in shop at one time.	Average 26
2.	,, of hands.	254
3.	Average duration of stop in the shop.	12 months.
4.	Number turned out per annum. ...	Average 40

(*g*) Boiler Shop—

1.	Number of boilers in shop at one time. ...	Average 10 under heavy and 16 under light repair.
2.	,, of hands.	185
3.	,, of boilers turned out per annum. ...	Average 40
4.	List of machinery.	List attached.

(*h*) Carriage Building and Repair Shop—

1.	Number of carriages in shop at one time. ...	Average 40 under repairs and 43 reconstruction.
2.	Number of hands.	265
3.	,, of carriages turned out per annum. ...	322

(*j*) Wagon Building and Repair Shop—

1.	Number of wagons in shop at one time. ...	Average 85
2.	,, of hands.	101
3.	,, of wagons turned out per annum. ...	Average 510

(*k*) Paint Shop—

1.	Number of vehicles in shop at one time. ...	Average 20 carriages.
2.	,, of hands.	221
3.	,, of vehicles turned out per annum....	Average 290 carriages 500 waggons.

APPENDIX B.—(*continued.*)

(*l*) Sawmill—

1. Number of hands.	... ...	40
2. List of machinery.	... ...	List attached.
		Tons. cwt. qrs. lb.
3. Tonnage of outturn.	...	Average 431 5 0 1

(*m*) Tinkers' and Coppersmiths' Shop—

1. Number of hands.	... ...	61
2. List of machinery.	... ...	List attached.

(*n*) Fitting Shop—

Number of hands.	169
Total miles open.	832·28
„ number of engines.	166
„ „ of carriages.	516
„ „ of wagons.	4,506

(*d*) Smiths' Shop—

Cranes Porter bar.	6
Fans 12″ (only one in use at a time).	2
Furnace baiting.	1
„ spring.	2
Emery grinder.	1
Steam hammers, 30 cwt.	1
„ „ 15 „	1
„ „ 2 „	1
„ „ 1 „	4
Machine, bolt and rivet making.	1
„ nut and bolt making.	3
„ nut making.	1
„ punching and shearing.	1
„ rail pressing.	1
„ spring making.	1
„ „ testing.	1
Hot saw.	1

(*e*) Machine Shop—

Grinders, emery tool.	5
„ „ twist drill.	1
Machine cylinder boring.	1
„ slot drilling.	2
„ lapping and grinding.	1
„ drilling.	14
„ double cylinder boring.	1
„ universal milling.	1

APPENDIX B.—(*continued.*)

Machine, nut shaping.	2
„ ... planing.	5
„ slotting.	8
„ shaping.	14
„ ... screwing.	13
„ slide bar grinding.	1
Lathes.	55

(*g*) Boiler Shop—

Crane overhead travelling.	1
„ Porter bar.	3
Fan 6″.	1
Machine, copper stay rolling and screwing.	1
„ drilling, with flexible shaft.	3
„ punching and shearing.	3
„ drilling.	1
„ „ double.	2
„ „ radial.	1
„ „ pillar, on benches.	4
„ plate bending.	2
Emery tool grinders.	2
Rail pressing machine.	1
Pump, hydraulic boiler testing.	4
Riming and tapping machine.	1
Smiths' fires.	11

(*l*) Sawmill—

Machine, band sawing.	1
„ circular saw.	4
„ bench drilling.	5
General joiners.	2
Lathes.	2
Planing machine.	1
Log saw.	1
Saw sharpening machine.	2

(*m*) Tinkers' and Coppersmiths' Shop—

Cranes Porter bar.	2
Brazing fires.	5
Furnace, Tinsmiths'....	1
Burnishing lathe.	1
Machine, beading.	2
„ curvilinear.	2
„ circular beading.	1

APPENDIX B.—(*continued.*)

Machine, beading, large.	1
,, folding.	1
,, guillotine cutting.	1
,, rail pressing.	1
,, roller.	1
,, circular seaming.	1
, seaming line circular.	1
,, tube cleaning.	1

BENGAL AND NORTH-WESTERN RAILWAY.

(*a*) Iron Foundry—

1. Floor area.	58′×47′.
2. Number and capacity of cupolas.	One 1 ton, the other 3 tons.
3. ,, of Moulders.	26
4. ,, of Coremakers.	
5. Size of corestoves.	Nil.
6. Tonnage of outturn for locomotive.	
7. ,, ,, ,, carriage and wagon.	Tons 7¾ per month.
8. ,, ,, ,, others.	

(*b*) Brass Foundry—

1. Floor area.	36′×31′
2. Number of furnaces.	3
3. ,, ,, Moulders.	11
4. ,, ,, Coremakers.	
5. Size of corestoves.	Nil.
6. Tonnage of outturn for locomotive.	
7. ,, ,, ,, carriage and wagon.	Tons 1½ per month.
8. ,, ,, ,, others.	

(*c*) Pattern Shop—

1. Number of hands.	3

(*d*) Smiths' Shop—

1. Number of fires.	50
2. ,, of hands.	124
3. List of machinery.	List attached.
4. Tonnage of outurn.	Tons 18½ per month.

(*e*) Machine Shop—

1. List of machinery.	List attached.
2. Number of hands.	109

APPENDIX B.—(*continued.*)

(*f*) Erecting Shop—(Engine)—

1. Number of engines in shop at one time. ...	17·25
2. ,, of hands.	341
3. Average duration of stop in the shop.	97 days.
4. Number turned out per annum.	27 and 10 new erected.

(*g*) Boiler Shop—

1. Number of boilers in shop at one time.	7
2. ,, of hands.	60
3. ,, of boilers turned out per annum.	30
4. List of machinery.	List attached.

(*h*) Carriage Building and Repair Shop—

1. Number of carriages in shop at one time.	37
2. ,, of hands.	511 (both carriage and wagon).
3. Number of carriages turned out per annum.	113 and 6 newly erected.

(*j*) Wagon Building and Repair Shop—

1. Number of wagons in shop at one time.	98
2. ,, of hands. Number shown under	(*h*).
3. ,, of wagons turned out per annum.	345 repaired.
	324 newly erected.

(*k*) Paint Shop—

2. Number of hands.	130
3. ,, of vehicles turned out per annum.	996

(*l*) Sawmill Shop—

1. Number of hands.	31
2. List of machinery.	List attached.
3. Tonnage of outturn.	830 cub. feet per month.

(*m*) Tinkers' and Coppersmiths' Shop—

1. Number of hands.	12
2. List of machinery.	List attached.

(*n*) Fitting Shop—

1. Number of hands.	Included in (*f*).
Total miles open.	756
,, Number of engines.	110
,, ,, of carriages.	356
,, ,, of wagons.	2,983

APPENDIX B.—(*continued.*)

SAMASTIPUR SHOPS.

Hammers, Smiths'.	2
Lathes of sorts.	11
Machine, screw-cutting.	3
,, boring wood.	1
,, drilling.	4
,, emery-grinding.	1
,, general joiner.	2
,, morticing hand.	3
,, paint-grinding.	1
,, plate-bending.	1
,, punching and shearing.	1
,, saw band, circular, &c.	6
,, sewing leather.	1
,, tenoning.	1
,, shaping.	2
,, slotting.	4
,, plate-levelling.	7
,, tube-cutting.	1
,, magnet.	1
,, hand-drilling.	4
Hydraulic press.	2
Furnaces, tyre and spring.	3

SONEPORE SHOPS.

(*d*) Smiths' Shop—

Steam hammers.	2
Crane, smithy.	1
Furnace, file-tempering.	1

(*e*) Machine Shop—

Lathe, wheel-turning.	3
,, screw-cutting....	17
,, trinity.	1
,, facing.	1
,, turret head.	1
,, chasing.	1
Machine, slotting.	2
,, twist drill-grinding.	1
,, drilling.	7

APPENDIX B.—(*continued.*)

Machine, shaping.	3
,, planing.	3
,, slot-drilling.	1
,, emery wheel.	1
,, carriage and wagon tyre-drilling.	1
,, emery-buffing.	1
Grindstone and trough.	1

(*g*) Boiler Shop—

Machine, punching and shearing.	2

(*l*) Sawmill—

Machine, vertical saw.	1
,, circular saw.	1
,, saw-sharpening.	1
,, morticing.	2

(*m*) Tinsmiths' Shop—

Furnace, japanning.	1

EAST INDIAN RAILWAY LOCOMOTIVE.

(*a*) Iron Foundry—

2.	Number and capacity of cupolas.	6
3.	,, of moulders.	1,200
4.	,, of coremakers.	
6.	Tonnage of outturn for locomotive.	1,386
7.	,, ,, for carriage and wagon.	364
8.	,, ,, for others.	15,664

(*b*) Brass Foundry—

2.	Number of furnaces.	6
3.	,, of moulders.	60
4.	,, of coremakers.	
6.	Tonnage of outturn for locomotive.	144
7.	,, ,, for carriage and wagon.	*Nil*
8.	,, ,, for others.	7

(*c*) Pattern Shop—

1.	Number of hands.	50

(*d*) Smiths' Shop including Forge, and Bolt and Nut Shop—

1.	Number of fires.	125

APPENDIX B.—(*continued.*)

2.	Number of hands.	... 500
4.	Tonnage of outturn.	... 2,200

(*e*) Machine Shop—

2.	Number of hands.	... 40

(*f*) Erecting Shop (Engine) including Paint Shop—

1.	Number of engines in shop at one time.	About 75
2.	„ of hands.	... 600
3.	Average duration of stop in the shop.	... 270 days.
4.	Number turned out per annum.	... 73

(*g*) Boiler Shop—

1.	Number of boilers in shop at one time. ...	... 26
2.	„ of hands.	... 760
3.	„ of boilers turned out per annum. ...	... 100

(*m*) Tinsmiths' and Coppersmiths' Shop—

1.	Number of hands.	... 100

(*n*) Fitting Shop including Millwrights—

1.	Number of hands.	... 5,100
	Total number of engines.	... 596

EAST INDIAN RAILWAY CARRIAGE AND WAGON.

(*d*) Smiths' Shop—

1.	Number of fires.	... 50
2.	„ of hands.	... 186
3.	List of machinery.	... List attached.
4.	Tonnage of outturn. 1st half of 96.	139 tons new work 134 tons repaired

(*e*) Machine Shop— ... Under head Fitting Shop

(*h*) Carriage Building and Repair Shop—

1.	Number of carriages in shop at one time. ...	... 102
2.	„ of hands.	... 301
3.	„ of carriages turned out per annum. ...	... 2,932

(*j*) Wagon Building and Repair Shop—

1.	Number of wagons in shop at one time. ...	... 313
2.	„ of hands.	... 368
3.	„ of wagons turned out per annum. ...	...11,962

APPENDIX B.—(*continued.*)

(*k*) Paint Shop—

1.	Number of vehicles in shop at one time.	Coaching. 30 Goods. 50
2.	„ of hands.	... Painters. 122
3.	„ of vehicles turned out per annum.	Coaching. 649 Goods. 737

(*l*) Sawmill—

1.	Number of hands.	... 138
2.	List of machinery.	... List attached.
3.	Tonnage of outturn. Tons scantling converted from logs.	635

(*m*) Tinkers' and Coppersmiths' Shop—

1.	Number of hands.	... 95
2.	List of machinery.	... List attached.

(*n*) Fitting Shop—

1.	Number of hands.	... 444
2.	List of machinery.	... List attached.
	Total number of carriages.	... 1,371
	„ „ of wagons.	...10,206

(*d*) Smiths' Shop—

Chain tester—	1
Steam hammer, 12 cwt.	1
„ „ 10 „	1
„ „ 5 „	1
„ „ 2½ „	4
„ „ 2 „	7
„ „ ½ „	2
Machines, oliver bolt.	3
„ hot-sawing.	1
„ bolt-forging.	2
„ weighing.	1
Steam hammer furnaces.	3
Bending blocks.	8
Swage „	15
Grindstone and trough.	1
Slabs for straightening panels.	4

(*l*) Sawmill—

Machines, saw-sharpening.	4
„ key-cutting.	2
„ planing.	5

APPENDIX B.—(*continued.*)

Machines, frame saw.	...	...	...	...		1
,, circular saw.	...	...	...	...		4
,, rack sawbench.	...	...	...	...		1
,, grooving. ...	...	...	...	...		4
,, boring. ...	...	...	...	...		2
,, tenoning. ...	...	...	...	...		2
,, cross-cutting.	...	...	...	...		1
,, drilling. ...	...	...	...	...		1
,, morticing. ...	...	...	...	...		8
,, moulding. ...	...	...	...	...		1
Turning lathes. ...	...	...	...	...		3
Copying lathe. ...	...	...	...	...		1
Grindstones. ...	...	...	...	...		2
Crane. ...	...	...	...	...		1

(*m*) Tinsmiths' Shop—

Portable forge.	...	...	...	...		1
Anvils, Tinman's.	...	...	...	...	..	2
Tools, Lampmaker's....	...	...	...		sets.	3

(*n*) Fitting Shop—

Lathes, wheel.	...	...	...	...	...	17
,, gap, 18″	...	...	...	...	...	1
,, ,, 14″	...	...	...	...	...	2
,, screw-cutting, 11″	...	...	...	...		1
,, ,, ,, 9″	...	...	...	...		2
,, ,, ,, 8½″	...	...	...	...		1
,, ,, ,, 7″	...	...	...	..		9
,, ,, ,, ...	...	...	...	...		3
,, brass-finishing.	...	...	...	...		1
,, axle.	...	...	...	...	...	3
,, boring.	...	...	...	...	...	9
,, hand cone.	...	...	...	...	...	10
,, foot, 6″.	...	...	...	...	...	1
,, turning.	...	...	...	...	...	1
Machines, drilling.	...	...	...	...	...	25
,, ,, double spindle.		...	...	...	...	1
,, screwing. ...	...	...	...	...	...	1
,, ,, Seller's patent.		...	...	...	...	10
,, planing.	...	...	...	...	...	1
,, slotting.	...	...	...	...	...	2
,, shaping, 12″	...	...	...	...	...	1
,, ,, 8″	...	...	...	...	...	1
,, punching and shearing.		...	...	...	...	2

APPENDIX B.—(*continued.*)

					1
Machines, nut-tapping. ...	...	...	...	...	1
,, testing. ...	...	...	...	...	8
,, paint-grinding. ...	...	...	..	...	2
,, polishing. ...	...	...	...	...	1
,, oil-testing. ...	...	...	...	...	1
,, weighing. ...	...	...	...	...	2
Tool-grinder. ...	...	...	...	...	2
Marking off tables. ...	...	...	...	...	2
Grindstones. ...	...	...	...	...	6
,, large. ...	...	...	...	...	1
Fly press.	...	...	...	...	1
Furnace, file-tempering.	...	...	...	...	1
,, ,, annealing.	...	...	...	...	1
,, brass-melting.	...	...	...	...	1
,, ,, ,, Fletcher's.		...	...	...	1
Fan, blast.	...	...	...	...	1

EASTERN BENGAL STATE RAILWAY—BROAD GAUGE.

(*a*) Iron Foundry—

1. Floor area. ...	...	109′ × 40′
2. Number and capacity of cupolas.	2 ordinary, 3 tons per hour. 1 Stewart's, 5 ,, ,,	
3. Number of Moulders. ...	... ...	112.
4. ,, ,, Coremakers. ...	... ...	
5. Size of corestove.		
6. Tonnage of outturn for loco. ...		71 tons 12 cwt. average for 6 months.
7. ,, ,, carr. and wagon.		
8. ,, ,, others. ...		

(*b*) Brass Foundry. To be enlarged—

1. Floor area. ...	... ...	56′–6″ × 20′
2. Number of furnaces.	... ...	3
3. ,, of Moulders.	... ...	8
4. ,, of Coremakers.	... ...	
5. Size of corestove.	... ...	6′ × 6′ × 6′
6. Tonnage of outturn for loco. ...		2 tons 1 cwt. average for 6 months.
7. ,, ,, carr. and wagon.		
8. ,, ,, others. ...		

(*c*) Pattern Shop. To be enlarged—

1. Number of hands. ...	...	5 men and 2 boys.

APPENDIX B.—(*continued.*)

(*d*) Smiths' Shop—

1.	Number of fires....	51
2.	„ of hands.	132
3.	List of machinery.	List attached.
4.	Tonnage of outturn. ...	Average for 6 months, 10 tons, 1 cwt.

(*e*) Machine Shop—

1.	List of machinery.	List attached.
2.	Number of hands.	192

(*f*) Erecting Shop (Engine)—

1.	Number of engines in shop at one time.	13
2.	„ of hands.	136
3.	Average duration of stop in the shop. ...	Three months.
4.	Number turned out per annum.	70

(*g*) Boiler Shop—

1.	Number of boilers in shop at one time.	7
2.	„ of hands.	216
3.	„ of boilers turned out per annum.	13
4.	List of machinery.	List attached.

(*h*) Carriage and Wagon Repair Shop—

1.	Number of carriages repaired in shop and passed on to (*k*) at one time. ...	—
2.	Number of hands	169
3.	„ of carriages turned out per annum	219

} One shop.

(*j*) Wagon Building and Repair Shop—

1.	Number of wagons in shop at one time ...	46·5
2.	„ of hands.	—
3.	„ of wagons turned out per annum.	706

(*k*) Paint and Repair Shop (repairs to inside of carriages only) and carriage building—

1.	Number of vehicles in shop at one time.	31·6
2.	„ of hands.	196
3.	„ of vehicles turned out per annum.	105

(*l*) Sawmill—

1.	Number of hands.	44
2.	List of machinery.	List attached.
3.	Tonnage of outturn.	23 tons per month.

(*m*) Tinkers' and Coppersmiths' Shop—

1.	Number of hands.	24 men and 12 boys.
2.	List of machinery.	List attached.

APPENDIX B.—(*continued.*)

(*n*) Fitting Shop—

1.	Number of hands.	142
	Total miles open.	374·89
	„ number of engines.	117
	„ „ of carriages.	463
	„ „ of wagons.	2,181

(*d*) Smith's Shop—

	Steam hammers.	5
	Bolt and nut-making machine.	1
	Punching and shearing machine.	1
	Hot saw.	1
	Planishing machine.	1

(*e*) Machine Shop—

	Lathes, wheel.	9
	„ tyre, boring....	1
	„ cylinder, boring.	1
	„ with 2 headstocks.	4
	„ with 3 „	4
	„ of sorts.	29
	Machines, drilling.	21
	„ planing.	5
	„ milling.	3
	„ slotting.	4
	„ cold-sawing.	1
	„ screwing....	6
	„ tapping.	1
	„ emery-grinding and buffing....	11
	„ universal boring and turning.	1
	„ crank pin-turning.	1
	„ oil-testing.	1
	„ magnetting.	1
	Hydraulic wheel presses.	2

(*g*) Boiler Shop—

	Machines, large, punching and shearing.	2
	„ small, „	1
	„ plate-bending.	2
	„ hydraulic rivetting.	2
	Flexible shaft for drilling.	1

(*l*) Sawmill—

	Vertical frame saw.	1
	Circular saw benches.	3

APPENDIX B.—(*continued.*)

Machines, grooving.	2
,, planing.	2
,, morticing.	2
,, tenoning.	2
,, band saw.	1
,, drilling.	1
Emery grinder.	1
Grindstones.	2
Turning lathe.	1

(*m*) Tinker's and Coppersmith's Shop—

Machine, punching.	1
,, shearing.	1
,, bending.	1
,, grooving.	1
,, circular-cutting.	1
,, rolling.	1
,, sawing.	1
,, tube-rolling.	1
,, tube-testing.	1

EASTERN BENGAL STATE RAILWAY—METRE GAUGE.

(*b*) Brass Foundry—

1.	Floor area.	918 sq. ft.
2.	Number of furnaces.	3
3.	,, of moulders.	1
4.	,, of coremakers.	8
5.	Size of corestove.	*Nil.*
6.	Tonnage of outturn for loco. ...	Ton cwt. qr. lbs.
7.	,, ,, carr. & wagon.	1 6 2 19
8.	,, ,, others. ...	

(*c*) Pattern Shop—

1.	Number of hands.	2

(*d*) Smith's Shop—

1.	Number of fires.	24
2.	,, of hands.	72
3.	List of machinery.	... List attached.
		Tons. cwt. qr. lbs.
4.	Tonnage of outturn.	2 5 2 2.

APPENDIX B.—(*continued.*)

(*e*) Machine Shop—

1.	List of machinery.	List attached.
2.	Number of hands.	74

(*f*) Erecting Shop (Engine)—

1.	Number of engines in shop at one time.	12
2.	,, of hands.	93
3.	Average duration of stop in the shop. ...	13 weeks.
4.	Number turned out per annum.	44

(*g*) Boiler Shop—

1.	Number of boilers in shop at one time.	4
2.	,, of hands.	82
3.	,, of boilers turned out per annum ...	32 Light and heavy repairs.
4.	List of machinery.	*Nil.*

(*h*) Carriage Building and Repair Shop—

1.	Number of carriages in shop at one time.	57
2.	,, of hands.	138
3.	,, of carriages turned out per annum.	About 290

(*j*) Wagon Building and Repair Shop—

1.	Number of wagons in shop at one time. ...	About 158
2.	,, of hands.	Included in (*h*)
3.	,, of wagons turned out per annum.	About 785

(*k*) Paint Shop—

1.	Number of vehicles in shop at one time.	About 18 carriages and 65 wagons painted monthly.
2.	,, of hands.	112
3.	,, of vehicles turned out per annum.	About 216 carriages and 780 wagons.

(*l*) Sawmill—

1.	Number of hands.	16
2.	List of machinery.	... List attached.
3.	Tonnage of outturn.	...11 tons, 12 cwt.

(*m*) Tinsmith's and Coppersmith's Shop—

1.	Number of hands.	8
2.	List of machinery.	*Nil.*

APPENDIX B.—(*continued.*)

(*n*) Fitting Shop—

1. Number of hands.	107
Total miles open.	445·25
„ number of engines.	72
„ „ of carriages.	325
„ „ of wagons.	1,861

(*d*) Smith's Shop—

Steam hammers.	2
Spring-tester.	1
„ furnace.	1

(*e*) Machine Shop—

Lathes, wheel.	6
„ axle-turning.	1
„ hand.	3
„ 18″.	1
„ 12″.	1
„ 10″.	1
„ 8″.	1
„ screw-cutting and brass-turning.	9
Machines, universal milling.	1
„ drilling.	6
„ „ slot.	1
„ planing.	3
„ Tube rimering.	1
„ „ sawing.	1
„ emery buffing.	1
„ „ polishing.	1
„ „ grinding.	1
„ punching and shearing.	1
Grindstones.	2
„ emery.	1
Wheel press.	1

(*l*) Sawmill—

Machine, planing, hand.	1
„ „ power.	1
„ general, joiner.	1
„ sawing, circular, hand.	1
„ „ „ power.	1
„ band saw.	1
„ tenoning.	1

APPENDIX B.—(*continued.*)

Machine, morticing and boring.	1
„ saw-sharpening.	1

BENGAL-NAGPUR RAILWAY.

(*a*) Iron Foundry—

1. Floor area.	4,144 sq. ft. including Brass Foundry.
2. Number and capacity of cupolas.	2 of 2 tons each.
3. „ of Moulders.	13
4. „ of Coremakers.	1
„ of Trimmers.	10
5. Size of corestove.	10′×5′×10′.
6. Tonnage of outturn for locomotive.	9 tons per month.
7. „ „ for carriage and wagon.	
8. „ „ for others.	

(*b*) Brass Foundry—

1. Floor area.	Included in (*a*)
2. Number of furnaces.	2
3. „ of Moulders.	6
4. „ of Coremakers.	1
„ of Trimmers.	2
5. Size of corestove.	Nil.
6. Tonnage of outturn for locomotive.	1¼ tons.
7. „ „ for carriage and wagon.	
8. „ „ for others.	

(*c*) Pattern Shop—

1. Number of hands.	6

(*d*) Smith's Shop—

1. Number of fires.	33
2. „ of hands.	35
3. List of machinery.	List attached.
4. Tonnage of outturn.	Account not kept.

(*e*) Machine Shop—

1. List of machinery.	List attached.
2. Number of hands.	72

(*f*) Erecting Shop (Engine)—

1. Number of engines in shop at one time.	*9
2. „ of hands.	135
3. Average duration of stop in the shop.	5¼ months
4. Number turned out per annum.	*18

* Do not include those which come to shops for petty repairs. Our engines are new.

APPENDIX B.—(*continued.*)

(*g*) Boiler Shop—

1.	Number of boilers in shop at one time.	...1 per half-year
2.	,, of hands.	... 149
3.	,, of boilers turned out per annum. ...	... 2
4.	List of machinery.	... List attached.

(*h*) Carriage Building and Repair Shop—

1.	Number of carriages in shop at one time. ...	... 32
2.	,, of hands.	... 158
3.	,, of carriages turned out per annum....	... 284

(*j*) Wagon Building and Repair Shop—

1.	Number of wagons in shop at one time. ...	... 197
2.	,, of hands.	... 191
3.	,, of wagons turned out per annum. ...	... 514

(*k*) Paint Shop—

1.	Number of vehicles in shop at one time. ...	... 22
2.	,, of hands ... 138, both for loco. and car. and wagon.	
3.	,, of vehicles turned out per annum....	... 514

(*l*) Sawmill—

1.	Number of hands.	... 9
2.	List of machinery.	... List attached.
3.	Tonnage of outturn.	308 cubic feet per month.

(*m*) Tinker's and Coppersmith's Shop—

1.	Number of hands...	... 27
2.	List of machinery.	... List attached.

(*n*) Fitting Shop—

1.	Number of hands.	Included in (*f*)
	Total miles open. Single track including sidings.	960·56
	,, number of engines.	... 118
	,, ,, of carriages.	... 316
	,, ,, of wagons.	... 3,515

(*d*) Smith's Shop—

Annular hearth.	... 1
Furnace, tyre.	... 1
,, for nut and bolt machine.	... 1
,, faggotting.	... 1
Steam hammer, 15 cwt.	... 1
,, ,, 5 ,, ...	... 1
,, ,, 3 ,, ...	... 1

APPENDIX B.—(*continued.*)

Forging machine.	1
Nut, bolt and rivet-making machine.	1
Hot saw.	1
Spring furnace.	1
Spring maker's hearth.	2

(*e*) Machine Shop—

Lathes, wheel.	3
,, screw-cutting, 18″ break.	1
,, ,, ,, 10″ ,, ...	1
,, ,, ,, 8½″ ,, ...	1
,, ,, ,, 10″ gap.	3
,, ,, ,, 7¾″ ,, ...	1
,, ,, ,, 7½″ ,, ...	1
,, ,, ,, 5″ ,, ...	3
,, ,, ,, 9″	2
,, ,, ,, 7¾″	1
,, ,, ,, 5″	1
,, with turret head, 8½″	2
,, ,, ,, ,, 5	1
,, plain.	1
Machines, drilling.	4
,, ,, radial.	1
,, ,, slot.	1
,, screwing.	3
,, planing.	2
,, shaping.	5
,, slotting.	2
,, milling.	2
,, ,, nut.	1
,, quartering.	1
,, nut-tapping.	1
,, stay straightening and centreing.	1
,, cold sawing.	1
Emery-grinder.	1
,, ,, for twist drills.	1
Hydraulic wheel press.	1

(*g*) Boiler Shop—

Machine, plate bending.	2
,, punching and shearing.	2
,, screwing.	1
,, drilling.	1

APPENDIX B.—(*continued.*)

(*l*) Sawmill—

Rack saw.	1
Circular saw bench.	1
General joiner saw.	1
„ „ plane.	1
Turning lathe.	1
Band saw.	1
Machine, morticing and boring machine.	1
„ tenoning.	1
„ drilling.	2
„ screwing.	1
„ saw-sharpening.	2

(*m*) Tinsmith's and Coppersmith's Shop—

Coppersmith's hearth.	1
Lapping machine.	1

SOUTHERN MAHRATTA RAILWAY.

(*a*) Iron Foundry—

1. Floor area	140′×84′
2. Number and capacity of cupolas.	3. 1 of 3 tons, 1 of 2 tons and 1 of 1½ tons.
3. „ of moulders } 4. „ of coremakers }	 30
5. Size of corestoves.	1. 20′×10′.
6. Tonnage of outturn for Loco.	... 14·98 } Average
7. „ „ „ „ Carr. and wagon ...	... 4·52 } per
8. „ „ „ „ Others	... 1·11 } month.

(*b*) Brass Foundry—

1. Floor area	Included in (*a*) 1
2. Number of furnaces	... 3
3. „ „ moulders } 4. „ „ coremakers }	 28
5. Size of corestoves	1. 9′×6′
6. Tonnage of outturn for Loco.	... 3·14 } Average
7. „ „ „ „ Carr. and wagon ...	... 2·18 } per
8. „ „ „ „ Others	... 0·16 } month.

(*c*) Pattern Shop—

1. Number of hands	... 15

(*d*) Smith's Shop—

1. Number of fires	49 and 5 Furnaces
2. „ of hands	... 155
3. List of machinery	... List attached
4. Tonnage of outturn	... Not available

(*e*) Machine Shop :—

1. List of machinery	List attached
2. Number of hands	87

(*f*) Erecting Shop (Engine) :—

1. Number of engines in shop at one time	35
2. „ of hands	168
3. Average duration of stop in the shop ...	8 months
4. Number turned out per annum	69

(*g*) Boiler Shop :—

1. Number of boilers in shop at one time	35
2. „ hands	200
3. „ boilers turned out per annum	65
4. List of machinery	List attached

(*h*) Carriage building and Repair Shop :—

1. Number of carriages in shop at one time	80
2. „ hands	137
3. „ carriages turned out per annum	618

(*j*) Wagon building and Repair Shop :—

1. Number of wagons in shop at one time	220
2. „ hands	62
3. „ wagons turned out per annum	771

(*k*) Paint Shop :—

1. Number of vehicles in shop at one time	300
2. „ hands	18
3. „ vehicles turned out per annum	1389

(*l*) Sawmill Shop :—

1. Number of hands	33
2. List of machinery	List attached.
3. Tonnage of outturn	42 tons per month.

(*m*) Tinkers' and Coppersmiths' Shop :—

1. Number of hands	25
2. List of machinery	List attached.

(*n*) Fitting Shop :—

1. Number of hands	137
Total miles open	1556·25
Total number of engines	220
„ „ „ carriages	903
„ „ „ wagons	4,704
Number of depôts on the line	11

(*d*) Smiths' Shop:—

Blower, Root's, patent		3
Centres for straightening axles		1
Crane, 15 feet radius		2
,, 17 ,, ,,		1
,, 12 ,, ,,		2
Forges, blacksmiths', single		31
,, six fires		3
Furnace case hardening		1
,, file tempering		1
,, spring		2
,, tyre		1
Grindstone		1
Machine.—Bolt and nutmaking		1
,, forging		1
,, hot iron sawing		1
,, punching and shearing		1
,, spring testing		1
,, weighing		1
Steam hammer	30 cwts	1
,,	15 ,,	1
,,	5 ,,	1
,,	3 ,,	2
,, stamp	5 ,,	1

(*e*) Machine and Fitting Shop:—

Cranes, travelling		2
Lathes, wheel		5
,, tyre, boring		2
,, journal		1
,, screw, cutting	18″ centres	1
,, ,, ,,	15″ ,,	1
,, ,, ,,	12″ ,,	4
,, ,, ,,	10″ ,,	9
,, brass finishing	8″ ,,	5
,, screw cutting	8½″ ,,	1
,, ,, ,,	8″ ,,	9
,, ,, ,,	7″ ,,	1
,, ,, ,,	6″ ,,	4
,, ,, ,,	6″ ,,	2
,, heading and pointing	6″ ,,	1
,, stud, turning	6″ ,,	1
,, axle brass, boring		1
,, stay rolling, chasing, &c.		1
Grindstones		2

Machines, drilling	14
,, ,, radial	2
,, slot drilling	2
,, milling	4
,, cutter forming	1
,, grinding	1
,, brass, finishing	1
,, cock, grinding	1
,, centreing	1
,, emery grinding	4
,, shaping	4
,, planing	4
,, quartering	1
,, screwing	1
,, slotting	5
,, band saw for cold metal	3
,, band polishing	1
,, emery buffing	1
Grindstones 7′ × 1′	2

(*g*) Boiler Shop:—

Blower Root's	1
Crane, 12 tons	1
Grindstone	3
Machine, drilling	2
,, ,, radial	1
,, ,, multiple	1
,, angle iron bending	2
,, ,, plate bending	1
,, ,, edge planing	5
,, punching and shearing	

(*l*) Saw mill:—

General Joiner	1
Grindstones	2
Wood lathe	1
Machine cutter grinding	1
,, shaping double spindle	1
,, band sawing	3
,, morticing	1
,, saw sharpening	1
,, ,, gulleting	1
,, surface planing	1
,, vertical boring	1
,, weighing	1

Circular saw benches	7
„ saw crosscut	2
Saw bench rack	1
Saw log frame	1

(*m*) Tinkers' and Coppersmiths' Shop :—

Machine, circle edge bending	1
„ „ cutting	1
„ folding	1
„ guillotine shears	1
„ punching	1
„ planishing	1
„ drilling	1
„ stamping	1
„ tube sawing	1
„ „ testing	1
„ „ drawing	1
„ plate bending	1

SOUTH INDIAN RAILWAY.

(*a*) Iron Foundry :—

1. Floor area.	78′-3″ × 48′-10¼″
2. Number and capacity of cupolas. ...	... 1 of 4 tons
3. „ of moulders.	... 73
4. „ of coremakers	... 50
5. Size of corestove	23′ × 12′ × 10′-5″
6. Tonnage of outturn for loco. ...	} Tons 247·754 per annum.
7. „ „ for carr. and wagon.	
8. „ „ for others. ...	

(*b*) Brass Foundry :—

1. Floor area.	...Included in (*a*)
2. Number of furnaces.	 6
3. „ of moulders.	} Included in (*a*)
4. „ of coremakers.	
5. Size of corestove.	...Included in (*a*)
6. Tonnage of outturn for loco. ...	} Tons 56·45 per annum.
7. „ „ for carr. and wagon.	
8. „ „ for others. ...	

(*c*) Pattern Shop :—

1. Number of hands.	9

(*d*) Smiths' Shop :—

1. Number of hands....	263 + 59 on spring work, Total 322
2. „ of fires.	86

3. List of machinery.	List attached.
4. Tonnage of outturn. ...	Tons 235·9775 per annum.
Springs ... 2,238 engine, and 1,741 carriage and wagon springs.	

(*e*) Machine Shop—

1. List of machinery.	List attached
2. Number of hands.	194

(*f*) Erecting Shop (Engine)—

1. Number of engines in shop at one time.	26
2. „ of hands.	312
3. Average duration of stop in the shop. ...	22·164 weeks.
4. Number turned out per annum.	61

(*g*) Boiler Shop—

1. Number of boilers in shop at one time.	14
2. „ of hands.	272
3. „ of boilers turned out per annum.	44
4. List of machinery.	List attached.

(*h*) Carriage Building and Repair Shop—

1. Number of carriages in shop at one time.	191
2. „ of hands.	593
3. „ of carriages turned out per annum.... ...	531

(*j*) Wagon Building and Repair Shop—

1. Number of wagons in shop at one time.	196
2. „ of hands.	179
3. „ of wagons turned out per annum.	355

(*k*) Paint Shop—

1. Number of vehicles in shop at one time.	———
2. „ of hands.	251
3. „ of vehicles turned out per annum.	549

(*l*) Sawmill—

1. Number of hands.	98
2. List of machinery.	List attached
3. Tonnage of outturn.	Tons 612

(*m*) Tinker's and Coppersmith's Shop—

1. Number of hands.	54
2. List of machinery.	*Nil.*

APPENDIX B.—(*continued.*)

(*n*) Fitting Shop—

1. Number of hands. ...	Loco.	64	
	Carr. and wagon ...	82	
Total miles open.		1,104	
„ number of engines.		205	
„ „ of carriages.		——	
„ „ of wagons.		——	

(*d*) Smith Shop—

Machine, bolt and nut-forging.	1
„ bolt-making.	1
„ Oliver, for ferrule-making.	1
„ swaging.	1
„ spring-testing.	1
Cranes, wall.	8
Crane, jib, vertical.	1
Centres for straightening axles.	pair 1
Grindstone.	1
Hydraulic wheel presses.	4
Steam hammer, 15 cwt	1
„ „ 10 „	1
„ „ 5 „	1
Weighing machine.	1

(*e*) Machine Shop—

Lathes, engine wheel.	3
„ „ and tender wheel.	4
„ carriage and wagon wheel.	6
„ tyre-boring.	2
„ screw-cutting.	11
„ turning.	12
„ lapping.	2
„ axle brass-boring.	2
„ nut-facing.	1
Machine, planing.	4
„ shaping.	6
„ slotting.	2
„ drilling.	11
„ „ country.	4
„ „ wheel.	2
„ screwing.	7
„ wheel-cutting.	1
„ polishing, double.	1
„ milling.	1

APPENDIX B.—(*continued.*)

Machine, buffing.	1
„ nut-shaping.	1
„ cutter-grinding.	1
„ bed.	1
„ quartering....	1
„ shafting.	1
„ emery tool-grinding.	3

(*g*) Boiler Shop—

Machine, punching and shearing, large.	1
„ „ „ „ small...	1
„ plate-bending.	1
„ drilling.	3
„ washer-punching.	1
„ tube-cutting.	1
„ cleaning.	1
Grindstone....	1
Hotsaw.	1

(*l*) Sawmill—

Vertical frame saw.	1
General joiner.	1
Planing machine, large, self-acting.	1
„ „ small, hand...	2
Morticing machine.	1
Tenoning machine.	2
Shaping machine, double.	1
Surfacing machine.	1
Circular saw benches.	4
Saw-sharpening machines.	2
Planing machine-cutter grinder.	1
Drilling machines.	2
Cross-cut saw bench...	1
Bandsaw.	1
Wood-boring machines.	2
Wood lathes.	3

——

Page 10, *Question J.*

APPENDIX C.

The following is a list of the imprest stores, some or all of which are allowed at out-stations on the RAJPUTANA-MALWA RAILWAY:—

Acid, muriatic.
Asbestos card board.
Bamboos, male, 6 feet.
Black lead powder.
Borax.
Brass sheet, $\frac{1}{8}$".
" " $\frac{3}{16}$".
Brooms, country, small.
" " large.
Buckets, iron, galvanized.
Chalk, English.
Coffins of sizes.
Coir cordage.
Copper rod, $\frac{3}{8}$".
" sheet, $\frac{1}{8}$".
Cotton waste, No. 1.
" " Nos. 2 or 3.
Emery cloth of sorts.
" powder.
Gauze wire.
Glasses, gauge, $\frac{1}{2}$".
" " $\frac{5}{8}$".
" lamp, 5" × 4".
" " 5" × $3\frac{3}{4}$".
" " 5" × $2\frac{3}{4}$".
Hose, leather or india-rubber, $2\frac{3}{4}$" diam.
India-rubber insertion, $\frac{1}{16}$".
Iron plate, $\frac{1}{4}$".
" sheet, $\frac{3}{16}$".
" " $\frac{1}{8}$".
" " $\frac{1}{16}$".
" bar of sizes.
Jute, packing.
Leather laces.
Lead, pig.
" sheet.
" red.
" white.
Marline tarred.
Nails, iron, of sizes.
Oil, castor.
" cocoanut.
" kerosine.
" linseed, boiled.
Paint, black, moist.
" red "
" white "
Potash, prussiate.
Powder, disinfecting.
Rings, india-rubber gauge glass, $\frac{5}{8}$".
" " " " $\frac{1}{2}$".
Resin.
Sajji mati.
Salamoniac.
Screws, iron, of sizes.
Shovels, coal.
" stoking.
Soap, country.
Spelter, brazing.
Spun yarn.
Solder, soft.
Steel of sorts.
Sulphur.
Tacks.
Tallow.
Tamarind beans.
Tin sheets of sorts.
Tin block.

APPENDIX C.—(*continued.*)

Turpentine.
Whip cord.
White metal, Babbitt's patent.
Wicks, hand lamp.
" kerosine.
" reading.
Wicks, roof.
Wire, copper.
" iron.
" split pin of sizes.
Wool or worsted trimming.

The above to be supplied by Depôt Storekeeper.

Baskets, coal.
Bolts, iron, of sizes with nuts.
Files of sorts.
Hose, india-rubber feed pipe.
Kettles, tallow.
Nuts, iron, of sizes.
Oil feeders.
Pipe, copper, of sizes.
Plugs, tube, iron, of sizes.
Rivets, iron, of sizes.
Studs of sizes.
Washers, iron, of sizes.

The above to be supplied by the Locomotive Storekeeper.

The following is a list of the imprest stores, some or all of which are allowed at out-stations on the INDIAN MIDLAND RAILWAY:—

Acid, carbolic.
" muriatic.
Asbestos, loose.
Axle boxes.
" " brasses for.
" " covers for.
" " leathers for, or face plate washers.
Baskets, coal on coke, one maund capacity.
Borax, refined.
Brake blocks for Pass, engines.
" " " tenders.
" " goods engines.
" " " tenders.
" " incline brake vans.
" " wagon standard.
" " brake vans.
" " standard for coaching automatic vacuum.
Bricks, arch special fire bricks for compound engine.
" " " " passenger engine.
" bath.
" fire, best, English.
Brooms, Goa, 1 lb. each.
" horse hair, with handles, 6 feet long.
Brushes, banister.
Chalk, white.
Chursas or moats, leather.

APPENDIX C.—(*continued.*)

Clay, fire, best, English.
Copper wire, 20 B. W. G.
Cord, cotton, English, 10 B. W. G.
Cotters, split, big end.
Diaphragms, india-rubber, for vacuum brakes.
Dusters, cotton, common, large, 24 inches square.
Dust shields, leather, for axle boxes.
Emery cloth, Nos. 1, 2 and 3.
„ powder, Nos. 1, 2 and 3.
Ferrules, steel, boiler.
Files, flat, bastard, 14″, 10″ and 6″.
„ „ smooth, 14″, 10″ and 6″.
„ „ second cut, 14″ and 10″.
„ fish back, bastard, 14″.
„ „ second cut, 14″.
„ round, smooth, 12″ and 8″.
„ half round, bastard, 14″ and 10″.
„ „ second cut, 14″ and 10″.
„ „ smooth, 14″ and 10″.
„ round, bastard, 14″ and 12″.
„ square, smooth, 6″.
„ „ second cut, 14″ and 6″.
Flax, dressed, best.
Glass or sand paper, Nos. 1, 2 and 3.
Glasses, gauge, "Eureka," 14″ × $\frac{5}{8}$″.
„ „ for sight, feed lubricators.
Glass sheets, white, 20″ × 16″ × $\frac{1}{8}$″.
„ „ „ 14″ × 12″ × $\frac{1}{8}$″.
Handles, hammer, hand, English.
„ „ sledge, „
„ for coal shovels.
„ for files.
„ for stoking shovels.
Hose, canvas, for feed connection, 3′ × 2$\frac{1}{2}$″.
„ „ for water columns, 6′ × 10″.
Hose, indian-rubber, for vacuum brake.
Iron gauge wire.
Lamp burners for engine head lamp.
„ „ „ hand „
Lamp chimneys, 2$\frac{1}{2}$″, 2″, and 1$\frac{3}{4}$″.
Lamp glasses for engine gauge lamps, 5$\frac{1}{2}$″ × 2$\frac{3}{8}$″.
„ „ „ „ 5″ × 2$\frac{3}{4}$″.
„ „ „ „ 5$\frac{1}{8}$″ × 3″.

APPENDIX C.—(*continued.*)

Lamp glasses for engine gauge lamps, 4$\frac{3}{4}$″ × 2$\frac{3}{4}$″.
„ „ „ „ 4$\frac{5}{8}$″ × 2$\frac{3}{4}$″.
„ „ for hand lamps, 5$\frac{1}{2}$″ × 4$\frac{1}{4}$″.
„ „ „ 6″ × 4″.
„ „ „ 5$\frac{1}{2}$″ × 4$\frac{1}{8}$″.
„ „ „ 5$\frac{1}{8}$″ × 3$\frac{3}{4}$″.
„ „ „ 5$\frac{1}{8}$″ × 3$\frac{5}{8}$″.
„ „ for signal lamps, green, curved.
„ „ „ red „
„ „ „ white, round, 5″.
Leather washout pipe, 50′ long.
Lenses for buffer lamps, green, 7$\frac{1}{2}$″ diam.
„ „ red, „
„ „ white, „
Lead, pig.
„ black.
„ red.
„ plugs, 1$\frac{1}{4}$″ bottom size.
„ „ 1$\frac{9}{16}$″ „
Loco. packing, $\frac{3}{4}$″ diam., for piston glands.
„ „ $\frac{7}{16}$″ „ spindle „
Metal, Parson's, white, Nos. 1 and 2.
Nails, W. I. tack, $\frac{1}{2}$″.
Oil, castor.
„ cocoanut.
„ cylinder.
„ kerosine.
„ linseed, boiled, English.
Pads, lubricating.
Paint, lead, white, moist.
Pipes, I. R. for vacuum brake.
Plugs, washout.
Potash. Prussiate of.
Pumice, stone.
Rings, gauge glass, I. R., $\frac{5}{8}$″.
Rivets, iron, panheaded, 1″ × $\frac{3}{8}$″.
Rope, Manilla, 3$\frac{1}{2}$″.
Rosin, American.
Salammoniac.
Salt, common.
Sheet, I. R. 2′ × 2′ × $\frac{1}{8}$′, and 2′ × 2′ × $\frac{1}{16}$″.
Shovels, stoking, handled.
„ square nose „

APPENDIX C.—(*continued.*)

Soap, soft, English.
Soda, washing.
Spelter, brass.
Springs, spiral buffing, for carriage and wagons.
„ drawbar, „ „
Sulphur.
Skins, wash leather.
Solder, soft.
Spring, buffing, engine and tender.
„ draw „ „
Stays, copper, $6' \times 1''$ and $6'' \times \frac{15}{16}''$.
Steel wire split pins, $3\frac{1}{4}'' \times$ No. 00 & No. 1
„ „ $3'' \times$ „ 00 „ 3
„ „ $2\frac{3}{4}'' \times$ „ 3
„ „ $2\frac{1}{2}'' \times$ „ 3 „ 6
„ „ $2'' \times$ „ 3 „ 7
„ „ $1\frac{1}{2}'' \times$ „ 7 „ 11
„ „ $1\frac{1}{4}'' \times$ „ 11
„ „ $1'' \times$ „ 11 „ 14
„ „ $\frac{1}{4}'' \times$ „ 0
„ „ $\frac{3}{16}'' \times$ „ 0
Tallow, country, best.
Tin, ingot.
„ sheet, double.
Tubes, boiler, brass.
Turpentine.
Twist, cotton.
Valves, I. R., for steam pump, $5''$ diam. $\times \frac{5}{8}''$.
Wagon bearing spring shackles with pins.
Waste, cotton, Nos. 1 and 2.
Wicks, tape, $1\frac{1}{2}''$ and $2\frac{1}{2}''$ wide.
Wool, worsted, for trimming.
Yarn, coir, Maldive.
„ spun, dressed.

On the Bengal-Nagpur Railway any or all of the following items are allowed to out-stations :—

Item.	*Small shed.*	*Big shed.*
Asbestos, A.	½ lb.	½ lb.
„ B.	½ „	½ „
Baskets, coal	50	50
Bricks, fire, engine, arch ...	76	190
Bricks, bath	3	5
Broom, Goa	10	20

APPENDIX C.—(*continued.*)

Item.	*Small shed.*	*Big shed.*
Copper wire, round, of sizes ...	1 lb.	1½ lb.
Chalk, white	½ „	1 „
Wicks for hand lamp	4 lbs.	8 lbs.
Emery cloth, No. 1	6 sheets.	10 sheets.
„ „ „ 2	12 „	20 „
„ powder of sorts ...	1 lb.	1 lb.
Handles, bamboos, solid, 36″ ...	5	10
„ „ „ 18″ ...	8	15
Jute, undressed	7 cwt.	14 cwt.
Lead, red, dry	3½ „	7 „
„ white, ground in oil ...	7 „	14 „
„ black, dry	½ lb.	1 lb.
Metal, white	10 ingots.	12 ingots.
Oil, castor	3,600 lbs.	7,200 lbs.
„ cylinder	280 „	900 „
„ kerosine	260 tins.	390 tins.
„ linseed, boiled	20 lbs.	40 lbs.
Plugs, tube, wooden	15	30
Paint, black, ground in oil ...	1¼ cwt.	1¼ cwt.
Rings, gauge, glass, india-rubber.	30	60
Rope, coir	28 lbs.	56 lbs.
Rosin	½ lb.	1 „
Salammoniac	1 „	2 lbs.
Screws, wood, iron, of sizes ...	2 gross.	3 gross.
Solder, brazing	1 lb.	2 lbs.
„ soft	½ „	1 „
Soap, bar	5 bars.	10 bars.
„ soft	10 lbs.	20 lbs.
Sulphur	1 „	2 „
Tallow, country	1 cwt.	2 cwt.
Tin sheet, $20'' \times 14''$	3	5
Turpentine	11 pints.	34 pints.
Twine, Bengal	1 lb.	2 lb.
Waste, cotton, superior ...	¼ cwt.	1 cwt.
Wool, worsted, for trimmings	2 lbs.	3 lbs.

Spare parts of Engines.

Bars, fire.
Brake blocks, engine.
Brasses, big end.
„ little end.
„ axle box, engine.
„ „ bogie.
Bushes, side rod, leading and trailing.

APPENDIX C.—(*continued.*)

Bushes, side rod, driving.
„ collar, piston.
„ „ valve spindle.
Cones injector No. 1.
„ „ 2.
„ „ 3.
„ „ 4.
Coupling, screw, complete.
Cotters, split, bright, $3\frac{1}{4}'' \times \frac{3}{4}'' \times \frac{5}{16}''$.
Link, bearing, spring, engine, long.
„ „ „ „ short.
Ferrules, boiler tubes.
Glasses, gauge, $\frac{3}{8}''$.
Gauge pressure.
Inspection, joint, complete.
Lubricator glass, parallel, of sizes.
Pins, safety, link, engine.
„ bearing spring, link, engine.
„ valve connecting rod.
Plugs, lead.
„ washout firebox.
„ „ smoke box.
Racks, fire bars, centre.
„ „ ends.
Rings, piston.
Spring, bearing, engine.
„ driving, Timmis'.
Straps, eccentric.
Stays, belly, bracket, iron, of sizes.
„ water space, copper, of sizes.
Valves, slide.

Spare parts of Tenders.

Axle boxes, C. I., leading and trailing.
„ „ centre.
Pipe ball and socket for tender, A.
„ „ „ with short neck, B.
Pins, safety, link, tender.
Brake blocks, tender.
Brasses, axle box, tender.
Cocks, feed, tender.
Links, bearing spring, tender.
Pins, bearing link, tender.
Springs, bearing, tender.

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APPENDIX D.

At Bandikui, the largest engine station on the RAJPUTANA-MALWA RAILWAY, where 65 engines are stationed, the following staff is employed :—

34 Cleaners.
12 Coalmen.
6 Washout Khalassies.
4 Chowkidars.
2 Call Boys.
9 Fitters.
3 Boilermakers.
1 Carpenter.
6 Coolies.
3 Pilot Enginemen.
4 Pointsmen.
2 Storemen.
4 Sweepers.
1 Bhisti.
1 Bearer.
3 Clerks in the Loco. Foreman's Office.
1 Peon.

The following list gives the staff employed at the nine engine stations on the INDIAN MIDLAND RAILWAY :—

	Names of Stations.								
	Jhansi.	Bina.	Itarsi.	Burkhera.	Bhopal.	Mohaba.	Manickpur.	Cawnpore.	Agra.
Number of engines	55	37	10	...	...	10	...	...	...
Foremen	1	1	1	...	...	1	...	1	1
Clerks	5	4	2	...	...	1	...	1	1
Office Boys	3	2	2	...	...	1	...	1	1
Store Clerk	1	1	...	1	...	1	1	...	...
Storeman	1	1	1	...	1	...	...	1	...
Store Coolies	1	1	1	1	...	1	...	...	...
Shed Muccadams	1	2	...	2	1	1	...	2	1
Fire Lighters	4	2	...	2	1	2	1	2	1
Tube Cleaners	4	2	1	2	1	1	...	1	...
Cleaner Muccadam	2	1	...	..	...	...	...	...	...
Cleaners	30	9	4	7	4	9	1	6	3
Cleaner Boys	...	6	...	...	...	...	...	...	...
Ashpit Cleaners	...	...	2	2	2	...	...	2	...
Call Boys	4	2	...	2	...	...	..	...	1
Coal Muccadams	2	...	...	1	...	...	...	...	...
Coalmen	...	...	...	7	...	...	...	6	5
Chowkidars	1	...	...	...	...	1	3	...	...
Pointsmen	4	2	...	1	...	...	2	...	...
Sweepers	1	1	...	...	...	...	...	...	...
Shed Coolies	4	3	..	...	...	...	...	...	...
Bar Boys	...	2	...	2	...	...	...	...	...
Cooks (For Drivers, Running Rooms.)	...	1	1	1	...	...	2	2	1
Bearers (For Drivers, Running Rooms.)	1	2	1	1	...	...	...	2	1
Box Boys (For Drivers, Running Rooms.)	...	1	...	1	...	...	...	2	1
Bhistis (For Drivers, Running Rooms.)	...	1	1	1	...	...	...	1	1
Sweepers (For Drivers, Running Rooms.)	...	1	...	...	...	...	...	...	1
Dhobies (For Drivers, Running Rooms.)	...	1	...	...	...	...	...	...	...
Steam Pump Drivers	...	4	1	1	1	2	...	1	...
„ „ Coolies	...	4	1	1	2	2	...	...	...
Ash Pickers	4	4	2	2	1	1	1	...	...
Leading Fitters	1	1	1	1	1	1	...	...	...
„ „ Assistant	1	...	...	...	...	...	...	...	...
Fitters	9	6	...	1	...	1	...	...	1
„ Assistants	6	3	...	1	...	1	...	1	...

APPENDIX D.—(*continued.*)

	Names of Stations.								
	Jhansi.	Bina.	Itarsi.	Burkhera.	Bhopal.	Mohaba.	Manickpur.	Cawnpore.	Agra.
Fitters Apprentices	...	4	...	...	...	...	...	...	...
„ Coolies	16	12	2	3	1	3	...	1	...
Boilermakers	3	2	...	4	1	...	...	...	...
„ Assistants	2	1	...	...	1	1	...	...	...
„ Coolies	3	3	...	1	...	...	...	...	1
Blacksmiths' Assistants	1	1	1	...	...	1	...	...	...
Strikers	1	1	1	...	...	1	...	...	...
Tinsmiths	...	1	...	...	...	1	...	...	...
Masons	1	1	...	1	...	...	...	...	...
„ Coolies	1	...	...	...	...	...	...	...	...
Wagon Fitters	2	1	3	...	1	...	1	1	1
„ „ Coolies	...	2	6	...	1	...	2	5	3
Carpenters' Assistants	2	1	1	...	...	...	...	...	...
Head Carriage Examiner	1	1	1	...	1	...	1	1	1
„ „ „ Assistant	1	1	...	...	...	...	1	...	...
Carriage Examiners	2	...	...	...	...	...	...	2	1
„ „ Assistants	3	2	3	1	1	...	...	4	1
Wheel Tappers and Gangers	4	2	4	...	1	...	...	3	1
Greasers	2	2	2	...	1	...	2	2	4
Cleaners	19	2	7	...	2	...	...	2	...
Bhistis	4	1	2	...	1	...	1	1	...
Sweepers	...	1	1	...	1	...	1	1	...
Screw-coupling Cleaners	...	...	2	...	...	...	...	...	...

The following list gives the details of the staff employed at the eight out-stations on the Bengal-Nagpur Railway:—

	Names of Stations.							
	Nagpur.	Umaria.	Sahdol.	Bilaspur.	Dongargarh.	Jharsaguda.	Chakandharpur	Assensole.
Number of engines	8	6	1	16	18	4	18	7
Dhobi	1	...	1	1	...	1	1	1
Bhisti	1	...	1	1	...	1	1	1
Cook	1	...	1	1	...	1	1	1
Box Boy	1	...	1	1	...	1	1	1
Call Boy	1	1	...	2	1	1	1	1
Pointsmen	1	1	1	1	1	1	4	2
Store Moonshi	4	1	1	1	1	1	1	1
Engine Cleaners	12	10	4	37	40	6	29	15
Coal Coolies	...	4	1	6	4	3	5	8
Coal and Cleaner Muccadams	1	1	1	2	2	2	2	2
Tube Cleaners	1	1	1	1	1	1	2	1
Pit Cleaners	2	2	1	5	...	2	4	...
Fire Lighters	2	1	1	2	1	1	2	1
Crane Muccadam and men	...	6	...	7	...	...	7	...

APPENDIX D.—(*continued.*)

	Names of Stations.							
	Nagpur.	Umaria.	Sahdol.	Bilaspur.	Dongargarh.	Jharsaguda.	Chakandharpur	Assensole.
Pumping Engine Driver	...	1	1	1	3	1	2	...
„ „ Cooly	...	1	1	1	4	1	2	...
Head Fitter (European)	...	...	...	1	1	...	1	...
Head Boilersmith (European)	...	...	...	1	...	...	1	...
Fitters, Turners, Boilersmiths, Blacksmiths, Carpenters and Assistants	4	6	3	11	9	4	13	7
Masons	...	...	...	1	1	..	1	...
Tinsmiths	...	...	...	1	1	...	1	...
Fitters, &c., Coolies	12	3	...	6	7	2	8	4
Shed Sweepers	1	...	...	...	...	...	...	1
Office Punkah Coolies	1	1	...	...	1	1	1	...

On the Oudh and Rohilkund, the following staff is employed:—

	Names of Stations.											
	Lucknow.	Moghal Serai.	Fyzabad.	Lhaksar.	Cawnpore.	Shajehanpore.	Bareilly.	Chandausi.	Moradabad.	Saharanpur.	Aligarh.	
Foremen	1	1	1	...	1	1	1	1	1	1	...	
Engine Shed Staff	...	...	...	...	...	...	...	...	...	...	...	
Clerks	3	3	1	...	1	1	1	2	3	1	...	
Peons	1	1	1	...	1	1	1	...	1	1	...	
Stores Coolies	1	1	1	...	...	...	...	1	1	...	...	
Engine Cleaners	4	12	9	...	6	11	7	14	28	8	4	
Fuel Coolies	17	8	9	...	2	10	2	2	9	...	...	
Fire Lighters	4	...	2	1	1	2	1	2	4	2	1	
Call Boys	4	1	...	...	...	...	...	1	2	...	...	
Pointsmen	4	1	...	...	...	1	...	2	2	...	...	
Sweepers	4	2	1	...	1	3	1	1	2	1	1	
Chowkidars	10	8	2	1	...	1	1	2	3	1	1	
Washoutmen	7	2	1	...	...	...	...	2	6	1	...	
Cinder Coolies	...	...	...	...	...	...	...	2	2	...	...	
Fitters	23	4	2	...	1	2	1	8	15	2	..	
„ Apprentices	...	...	...	...	...	...	...	5	1	...	...	
„ Coolies	17	3	1	...	2	1	1	10	10	1	...	
Blacksmiths	1	...	...	...	...	...	...	1	1	...	...	
„ Strikers	1	...	...	...	...	...	...	1	1	...	...	
Boilermakers	3	1	...	...	...	...	...	1	2	...	...	
Tinsmiths	1	...	...	...	...	...	...	1	2	...	...	
„ Coolies	...	...	...	...	...	...	...	...	1	...	...	
Turners	...	...	...	...	...	...	...	1	1	...	...	
Bearers	...	...	..	...	...	2	...	...	...	1	...	
Cooks	1	1	1	...	3	1	...	...	...	1	..	
Bhistis	2	...	...	...	1	1	...	...	...	...	...	

APPENDIX D.—(*continued.*)

	Names of Stations.										
	Lucknow.	Moghal Serai.	Fyzabad.	Lhaksar.	Cawnpore.	Shajehanpore.	Bareilly.	Chandasi.	Moradabad.	Saharanpur.	Aligarh.
Cook for Native Drivers' Runningroom	...	...	1	1	...	1	1	...	...	1	1
Carriage Shed Staff	...	...	...	...	...	...	...	..	...	...	...
Clerks	1	...	...	...	...	...	...	...	...	...	...
Peons	1	...	...	...	...	...	...	...	...	...	...
Carriage Examiners	3	1	...	...	1	...	1	1	...	1	1
„ „ Natives ...	4	1	...	...	1	...	...	...	...	...	..
Wheel Tappers	3	2	2	...	5	...	5	1	...	2	2
„ Gaugers	2	1	3	...	3	...	2	...	...	2	4
Lifters	18	5	4	...	...	...	6	12	...	2	..
Oilers	5	5	...	...	3	...	4	2	...	2	4
Carriage Washers	...	...	...	...	...	...	4	...	...	2	...
„ Cleaners	31	16	...	1	4	...	3	1	1	7	1
Coupling „	...	...	...	...	...	...	2	1	...	1	...
Buffer „	...	2	...	...	...	...	1	...	...	...	..
Stores Coolies	1	...	...	...	...	...	1	1	...	...	...
Sweepers	4	2	2	1	2	...	2	1	...	1	1
Bhistis	...	2	..	1	1	...	2	1	...	2	1
Carpenters	10	2	2	..	...	...	1	4	...	1	...
„ Coolies	4	...	...	...	...	...	1	...	...	...	...
Painters	18	...	...	...	...	...	...	7	...	...	...
„ Apprentices	...	...	...	...	...	...	2	1	...	...	...
Fitters	7	...	...	...	...	...	...	4	...	1	1
„ Apprentices	...	...	...	...	...	...	...	2	...	...	...
„ Coolies	3	...	...	...	...	...	...	...	...	...	...
Blacksmiths	2	...	...	...	...	...	...	...	...	...	...
Srikers	1	...	...	...	...	...	...	...	...	...	...
Jemadars	2	...	...	...	...	...	...	...	...	...	...
Number Takers	4	2	...	...	4	...	...	...	...	...	...
Pointsmen	2	...	...	...	...	...	...	...	...	...	...

The attached list shows the staff allowed at the out-stations on the BOMBAY, BARODA, AND CENTRAL INDIA RAILWAY:—

	Names of Stations.					
	Parel.	Bulsar.	Amnoli.	Gadhra.	Rutlam.	Ahmedabad.
Number of engines	60	29	...	11	17	45
Number of Foremen	1	1	...	1	1	1
Fitters	6	4	2	8	14	10
Boilermakers	3	2	...	3	2	8
Blacksmiths	1	1	...	1	1	2
Coppersmiths	...	...	...	...	1	...
Strikers	1	1	...	...	...	...
Bellows Boys	1	1	...	...	...	...
Coolies	8	5	1	10	10	18

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APPENDIX E.

S. No. 122 F.
revised.

71·96

B. B. & C. I. and R.-M. Railways.—TALLY SHEET No. _____

Ledger Folio No. _____ Compartment No. _____

Article _____

Voucher.		Receipts.				Issues.				Balance.				Initials.
No.	Date.	No.	cwt.	qr.	lbs.	No.	cwt.	qr.	lbs.	No.	cwt.	qr.	lbs.	

Page 15, Question 2.

APPENDIX F.

GREAT INDIAN PENINSULA RAILWAY COMPANY.

LOCOMOTIVE DEPARTMENT.

RATES OF PAY AND RULES FOR ENGINE-DRIVERS, FIREMEN AND AUGWALLAS.

Brought into force from the 1st January 1889.

These Rules are applicable only to men who may come into the service, or who may be promoted to the rank of Driver, Fireman, or Augwalla from this date, but it should be understood that any man who may prefer to be brought under the new Rules can be allowed by the Locomotive Superintendent to so change.

A month will be composed of 208 hours arising out of employment on any day *including Sunday*, and time will be calculated in payment of wages at the rates per hour set forth in the following tables :—

Class or Scale.	DRIVERS.	Rate per hour. Annas.	Batta per night.	Class or Scale.	FIREMEN AND AUGWALLAS.	Rate per hour. As.	Rate per hour. P.	Batta per night.
A	Lowest Rate ...	11	1 Rupee	Firemen. A	Lowest Rate ...	4	—	10 Annas.
	First Advance ...	12	„ „		Advanced „ ...	5	—	„ „
	Second „ ...	13	„ „	B	Lowest Rate ...	2	—	6 „
	Third „ ...	14	„ „		Advanced „ ...	3	—	„ „
B	Lowest Rate ...	9	„ „	Augwallas.	Lowest Rate ...	—	8	3 „
	First Advance ...	10	„ „		First Advance ..	—	9	„ „
C	Lowest Rate ...	6	8 Annas		Second „ ...	—	10	„ „
	First Advance ...	7	12 „		Third „ ..	1	—	„ „
	Second „ ...	8	„ „		Special „ ...	1	4	„ „
D	Lowest Rate ...	3	6 „		Special „ ...	1	8	„ „
	First Advance ..	4	„ „					

NOTE.—*Class A* is for Drivers only, who, in the opinion of the Locomotive Superintendent, are highly qualified, and who may be placed by him in that Class.

Class D is for Shunting and Branch Line Drivers who are not passed to work Main Line trains.

Rules.

1. All men on engagment, or on promotion from one class to another, will be rated and classed at the discretion of the Locomotive Superintendent, and advances in pay and promotion from one class to another will be made at the discretion of the Locomotive Superintendent.
2. Advances will not be granted at shorter intervals than twelve months counting from the 1st of January or 1st of July following the date of engagement, or last advance of pay.
3. All time occupied in travelling on duty will be paid for at the above rates.
4. Terminal allowances will be paid only when the staff is not otherwise paid for the same time.

Terminal allowance time will be paid as follows for time occupied in examining engines, taking coal, &c., and on the ghauts in compensation for short runs :—

	Before commencing duty. H.	Before commencing duty. M.	After completing duty. H.	After completing duty. M.
Ghaut trips—				
At Igatpuri and Kussara	2	—	1	—
At Lonauli and Kurjut	1	20	—	40
Byculla engines commencing or finishing duty at Victoria Terminus or Wari Bunder, and also all trips where the engine has to be turned by the Engine Staff	—	45	—	30
All other trips	—	30	—	15

5. All shunting time for which shunting orders are produced, and all shunting time allowed free to the Traffic Department, will be paid for, provided payment is not otherwise made for the same time.
6. Batta will be paid for each time the hour of midnight is passed away from the Home Station, the Time Table time being worked to.
7. Drivers, Firemen and Augwallas will always be paid for the whole of the time allowed by the Time Table for the trains they work. They will not be paid for any delays caused by their own neglect.
8. Washing out, &c.—
   This work will be done as the Locomotive Superintendent may direct, either by the usual Engine Staff, or by a Special Staff. In the former case payment will be made at the following scale :—
   For engines employed on the ghauts, 1 minute for each mile run.
   „ other engines ... ... 45 seconds „ „ „ „
9. Premiums will be awarded to Drivers for economic working in fuel and oil, but no Driver will be eligible for premium if he has misconducted himself during the period for which the premium is awarded.
10. Payment for Sick time.—
    (*a*) Sick time will only be paid for upon a certificate of a Company's Surgeon that the illness was not owing to misconduct. For each day (*Sundays excepted*) covered by such a Certificate, eight hours will be allowed.
    (*b*) Sick time will only be paid for so far as may be necessary to bring up the total time paid for in any one month to 208 hours.
    (*c*) Subject to the above, all employés (of six months' standing), under these Rules will be paid for their Sick time at half rate, up to a limit of three months in each year, counting from the 1st of January.
11. Payment for not required time.—
    When slackness of traffic or other causes beyond their control prevents employés under these Rules making 208 hours in any month, the balance short of 208 hours will be allowed and paid for at the rate of eight hours for each day that that the Foreman certifies that the man was available and ready for work.
    Not required time will be paid for at the lowest rate per hour of the respective classes.
12. All employés under these Rules may be required to work in any capacity for which they are qualified, and they will be paid for the time they are so employed at their ordinary rate per hour.
13. In certain events the Locomotive Superintendent may, and will modify, the above Rules, to meet special circumstances.

BOMBAY,
1st January 1889.

R. TREVITHICK,
Locomotive Superintendent.

RAJPUTANA-MALWA RAILWAY.

APPENDIX A to ESTABLISHMENT ROLLS and WORKING ESTIMATES for 1st HALF of 1895.

General Rules about Overtime and Payment by the Trip.

(Sanctioned in P. W. D. Circular No. XVIII R., dated 27th July 1880, and modified by P. W. D. No. 859 R. E. of 2nd November 1881, and Manager's No. 12955, dated 1st December 1881.)

1.—Eight hours (actual) to be considered a day's work for Shunters and Assistant Shunters and for Drivers and Fireman not working on the trip system, after which they will receive one-eighth of a day for every additional hour on duty.

2.—European Shunters and Assistant Shunters called upon to work a train to receive one rupee per day extra for that work, and Native Shunters and Assistant Shunters, 4 annas.

3.—Drivers and Firemen to be paid by the trip as per Schedule attached to this Roll, as Appendix B.

4.—Overtime to be calculated on a daily wage equal to one-thirtieth of the monthly salary.

5.—Men will not be paid overtime when time lost on the road through negligence is booked against the engine.

6.—All men called upon to work a train, or do shed on Sundays, to be paid overtime of not less than one day; Sunday work, in excess of a full day's work, being paid in addition at the usual overtime rate. Men whose Saturday's work only terminates on Sunday are not entitled to Sunday overtime, unless they are called for fresh duty on that day.

7.—Men who may be detained at out-stations on Sunday, and who are not called on to work on that day, will not be entitled to any overtime.

8.—Shed days are allowed to Drivers of Train Engines after they have completed four full days' work on the road.

Any extra shed work will be done by special staff.

9.—Men on short runs, or in charge of shunting engines, are allowed one shed day per week.

10.—Men should not be booked for shed on Sunday if their services are not required till Tuesday; in such cases they should be booked "*Nil*" on Sunday and "*Shed*" on Monday.

11.—As far as practicable eight hours' off duty at out-stations, and twelve hours' off duty at home stations, will be arranged; in no case will men be called upon to work a train within

six hours of the time of coming off their engines after having done a day's work, except in case of accident or breakdown of a train.

12.—Men who perform two days' work in one, that is, who make two full trips in 24 hours, will receive, in addition to their regular monthly pay, the overtime allowance due in each trip in accordance with the schedule of overtime, and will be entitled to rest until the expiry of 48 hours from the commencement of the first trip. If called out sooner, they will be paid one day's overtime.

Rule 12 will also be applied in cases of men who perform one full trip and complete more than half of a second trip (Consulting Engineer's No. 4142 of 1894).

13.—Shunting hours at stations, when allowed by Managers in addition to shunting included in trip work, to be paid to men as additional overtime calculated at one-eighth of a day per hour.

14.—Any point not specified in these rules to be referred to the Superintendent, or if necessary to the Manager.

15.—On short lines, where men are paid a consolidated salary, such arrangement need not to be disturbed.

16.—The Manager is empowered to frame subsidiary rules to suit local requirements, provided that no such subsidiary rule is contrary to the spirit of these rules.

Subsidiary Rules framed by the Manager under Rules 13 to 16.

17.—For any shunting exceeding 15 minutes, a shunting order will, as at present, be issued. All shunting for which a Driver receives a shunting order will be paid for as additional overtime—all other shunting belongs to the trips.

18.—A shed day to be reckoned as 24 hours from the time of coming off the last trip. Shed to be done at any convenient hour, and half a day's overtime given in case of a Driver being called out before the expiry of 24 hours.

19.—Men who, after a full day's work, are ordered out from an out-station, before they have had six hours' rest, or from their home station before twelve hours' rest (independent of 45 minutes before departure and 15 minutes after arrival) will receive overtime for every hour their rest has been so shortened; but the application of this rule should be very rare, as it is considered that Rule 11 meets all the necessities of the case.

20.—After the performance of such duty as does not constitute a day's work, men are not entitled to any overtime for going out within the time allowed for rest, either at home or at out-stations, and may be called when required.

21.—Drivers working short branches and ordinary ballast trains will be paid by time at the rate of eight hours per day, or by special rates per trip as may be fixed by the Locomotive Superintendent.

22.—At Ujjain, Jeypore, Rewari, Unjha, Siddhpur, Mandhana, Soron, Brahmavarta and Barwaha, where a Driver has to turn his own engine and stand in steam, half time will be paid.

23.—When a Driver superintends the lighting up of his own engine, he will be allowed two hours, and for dropping his fire, one hour.

24.—Drivers on the Mhow Ghats will be paid as per Rule 1 for the actual time on duty.

25.—Christmas Day is the only Holiday recognised as a Sunday.

26.—When a Driver runs a double trip on two successive Sundays without going out on the following day, he will, for the second Sunday's trip, receive one day's overtime in addition to the overtime for the double trip and the Sunday allowance.

27.—Men who having taken out a train or engine to an out-station, or having been summoned to an out-station to work a train or engine, travel as "passengers," will draw day and night allowance for each day's journey under the usual rules. If a man who has come off a trip is called upon to start on such a journey without the amount of rest allowed in Rule 19, he will receive allowances under that rule, in addition to day and night allowances. Overtime for the hours passed in the train as a passenger is not admissible.

The following additional rules were sanctioned :—

28.—In cases of emergency and sudden rush of traffic a Foreman or a Driver in charge working a train himself will draw an allowance or Rs. 3 per day, *vide* Resolution No. 265 of O. M. No. 7 of 1891.

29.—When trains are running late through no fault of the driving Staff, Engine Staff will be paid for the time made up by them on the road subject to para. 24 of the Working Time Bill and provided the time made up is vouched for by Guards on detention certificates. (Consulting Engineer's No. 4142 of 1894.)

30.—When working on the time system one hour will be added to each day's run, *viz.*, 45 minutes before the departure and 15 minutes after arrival of a train. (Consulting Engineer's No. 5033 of 1894.)

Day, Night, and Court Allowances to Drivers and Firemen. Mileage, Relieving, and Court Allowances to Guards and Brakesmen.

(*Sanctioned in P. W. D. Circular No. 25, Ry., of 7th November* 1881).

1. Managers of State Railways are empowered to sanction allowances subject to the following rules and scale :—

2. Day allowance means an allowance given to the Locomotive train staff working out of their stations during day-time, provided they leave their home station in the morning and return afternoon.

3. Night allowance means an allowance given to the Locomotive train staff called upon to be away from home at night, leaving before midnight and returning before noon next day.

4. Court allowance is admissible to both Locomotive and Traffic train staff when attending Court as witnesses on behalf of Government.

5. Relieving allowance means an allowance granted to Guards and Brakesmen when relieving a station-master or clerk for each 24 hours or portion of 24 hours so

employed. This allowance may also be granted to Guards and Brakesmen who are sent to out-stations for a time to relieve other Guards or Brakesmen or under pressure of traffic.

6. Relieving allowance cannot be admitted to any Guard or Brakesman for a continuous period of more than 30 days at the same station, unless the special sanction of the Manager has been recorded at an Official Meeting.

7. Mileage allowance is admissible to Guards and Brakesmen at a rate per 100 miles run with a train, and is granted on the condition that they appear when on duty in clean and smart uniform of such pattern as may be approved.

8. The actual cost of any suitable conveyance may be paid on the certificate of the Head of the Department to any Railway servant, not being a gazetted officer, who attends Court as a witness on behalf of Government;—Train staff receiving the allowances under Rules 4 and 9 in addition.

9. Allowances granted under the above rules are limited to following maxima in accordance with actual salary :—

Salary per mensem.			TRAIN STAFF OF RUNNING ESTABLISHMENT.							
			Locomotive.			Traffic.				
						Relieving.				
			Day.	Night.	Court.	At Head-Quarters.	Away from Head-Quarters.	Mileage per 100 miles.	Court.
Rs.		Rs.	Annas.	Annas.	Rs. a.	Rs. a.	Rs. a.	Rs. a.	Rs. a.
170	to	220	8	12	2 8	1 0	1 8	1 8	1 8
110	,,	169	8	12	2 8	1 0	1 8	1 8	1 8
75	,,	109	5	8	2 0	1 0	1 8	1 0	1 0
50	,,	74	3	5	1 0	0 8	1 0	1 0	1 0
30	,,	49	2	3	0 8	0 4	0 8	0 8	0 8
15	,,	29	2	3	0 8	0 3	0 6	0 6	0 6
Less than		15	1	2	0 4	0 2	0 4	0 4	0 4

Rules regarding allowances to Guards working ballast trains sanctioned under Government of India Public Works Department Circular No. VIII, Railway, dated 9th April 1885.

(1) Experienced Guards should be selected to work ballast trains, and during the time they are so serving, they may be allowed 10 per cent. of their salary in addition to their pay, the Traffic Superintendent certifying to their efficiency for the work. Guards so employed will be subject to all the Traffic Department Rules and Regulations.

(2) The following allowances may also be passed to them :—

(*a*) One day's pay when working on the line on a Sunday.

(*b*) After eight hours' work, pay at the rate of time only for all time in excess when the engine is under steam by order.

(*c*) A day allowance of Rs. 0-12-0 when away from Head-quarters after 6 P.M. after ten hours' work.

(*d*) A night allowance of Rs. 1-4-0 when away from Head-quarters after midnight.

3) The following allowances to be granted to Brakesmen working ballast trains on Mhow-Khandwa section, sanctioned by the Agent :—

(*a*) 10 per cent. of salary in addition to pay.

(*b*) One day's pay when working on the line on a Sunday.

(*c*) After eight hours' work, pay at the rate of time only for all time in excess when the engine is under steam by order.

(*d*) A day allowance of Rs. 0-1-3 when away from Head-quarters after 6 P.M., after ten hours' work.

(*e*) A night allowance of Rs. 1-2-0 when away from Head-quarters after midnight.

RAJPUTANA-MALWA RAILWAY.

APPENDIX B TO ESTABLISHMENT ROLLS AND WORKING ESTIMATES FOR FIRST HALF OF 1895.

LOCOMOTIVE DEPARTMENT.

Complete Schedule of Overtime Allowances payable by the Trip to Drivers and Firemen.

TRIPS.	No. of Miles.	Amount of Overtime Allowance per Trip.	REMARKS.
Delhi to Rewari and back	102		
Bandikui to Delhi	135		
" Agra	93½		
" " and back	187		
" Phulera	90½		
" " and back	180½		
" Ajmere	140		
" Jeypore and back	112		
Phulera to Ajmere and back	99½	0	
" Jeypore and back	68½	0	
" " and back twice...	137	2*	
Ajmere to Sujat	73½	0	
" " and back	147½	0*	
Ajmere to Abu Road	189½	1	
" Beawar and back	64½		
" Neemuch	150		
Sujat to Abu Road	115½	1*	
" " and back	231		
Sabarmati to Unjha and back	104½		
" Sidhpur and back	121½		
" Abu Road	111½		
" " back...	223½	1*	
Khandwa to Kalakund	62¼	0	
" " and back	126½		
" " or *vice versa* with one Barwaha special	111¼		
" " or *vice versa* with two Barwaha specials	160		
" Barwaha and back	78½		
Ujjain to Fatehabad and back, and thence to Mhow and *vice versa* ...	74½		
Mhow to Rutlam	86½		
" " and back...	173	0	
" Ujjain	49½		
" " and back	99	0	
" Fatehabad	37½		
" " and back	75	0	
" Indore and back	26		
Neemuch to Rutlam	82½		
" " and back	165½		
Rewari to Hissar	88½		
" " and back...	177½	0	
Sirsa to Hissar	50½		
" " and back	101½		
Rewari to Sirsa	139½		
Sirsa to Ferozepore	101	16	
Rewari to Hansi and back	148		
" to Bhiwani and back	102½	16	
Sirsa to Bhatinda and back	93½	16	
" to Kotkapura and back	146		
Cawnpore to Kasganj or *vice versa*	153¾		
Fazilka to Kotkapura and back	99½		
Kasganj to Achnera or *vice versa*	85¾		
" to " and back	171½	1*	
Achnera to Hathras or *vice versa*	51½	0	
" to " and back	103½	0*	
Kasganj to Agra or *vice versa*	101¾		
" to " and back	203½	1*	
Bandikui to Rewari or *vice versa*	84		
" to " and back	168		
Abu Road to Ahmedabad and back to Sabarmati	119½	1*	
Bandikui to Achnera or *vice versa*	77½		
" " and back	155		

* The overtime for the double trip on these runs will only be paid when the work performed can be counted for the day on which it was commenced and the men perform their ordinary duty the following day as per Rule 12.

N.B.—Journeys not included in Schedule to be reckoned in the same way, and if run in continuation of a trip, the actual time to be added to the trip.

The following additional rules were sanctioned in Resolution No. 302 *of Meeting No.* 9 *of* 1881 *and modified.* Vide *Cons. Engr.'s No.* 4142 *of* 1894.

When a Driver is detained on the road through no fault of his own for a longer time than that contemplated for the trip, the Driver may be awarded overtime at the following rate in addition to the trip allowance :—

For the first half hour ... ... Nil.

For every additional hour ... ... One-eighth of a day.

Vouchers for these detentions, certified by Station Masters, are to be attached by Drivers to their tickets.

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APPENDIX G.

BOMBAY, BARODA, AND CENTRAL INDIA RAILWAY.

MEMO. No. 45 OF 8TH JULY 1889.

Washing of Carriages.

Door handles should be cleaned and polished with bath brick, using either a piece of waste or a worn-out sponge cloth; care being taken that the door pillars, and panels are not smeared with the brick powder, &c.

Glasses, inside and outside, should be also cleaned after washing, nothing being better for this purpose than an old sponge cloth, properly cleaned beforehand. Carriage Examiners should pay strict attention to this work, seeing that the glasses are not polished before being properly washed, as many are entirely ruined by rubbing before the gritty matter upon them has been removed.

Venetians of First and Seconds should also be carefully dried with the drying sponge cloth and the inside examined for any water trickling down from between the blades.

After washing, cleaning, &c., is completed, the foot boards should be swilled with water and well brushed with Goa brooms, taking care that any water splashed upon the underframes is properly dried off again.

The insides, as soon as the Police have examined the carriages for left or lost articles, should be well brushed out, any badly soiled parts of intermediates, third class, brakes, &c., being washed with water and a little soap solution if necessary.

Trimmings of First and Second classes should be well rubbed with a dry sponge cloth, taking care to clean well the crevices in and around the buttons and along the line of the piping. If it is necessary a little water may be used where the dirt is difficulty to remove, also a little hard soap, but this should be used very carefully and well washed off at once. The cushions of First should be lifted up and the lining well dusted.

After all dusting is done below, the nets and round the ventilators and mouldings should be gone over with a moist washleather, or if very dirty use a sponge, clean water, and a little hard soap, taking care to dry it off thoroughly afterwards. This applies also to ceilings.

After the traffic have attended to the lavatories, and if a bad smell remain a small quantity of soluble "Phenyle," mixed with water, may be sprinkled upon the floor of the same. The white portions round the lavatories should be kept scrupulously clean, especially where they are often soiled round the basin.

APPENDIX G.—(*continued.*)

Road vans, brake vans and mail vans should, if very dirty, be well swilled out and a little "Phenyle" sprinkled in.

As the local brakes working between Colaba and Bandhera, Andheri, and Virar, are not subjected to the dust and sand like the main line brakes, it is not required that they should be drenched with water every day. Opportunity should be taken to thoroughly wash outside every vehicle at least once a week. This should be done by commencing at one end and washing one, two or as many at a time as the standing of the train will allow. By appointing a portion of the staff for this purpose, they could work round the whole stock of locals within, say, six or seven days. Of course, temporary cleaning may be required on some vehicles after every trip, but in such cases sponge cloths can be used, and by dusting and a little washing where required, the work in this direction can be reduced to a minimum. In using soft soap, not more than half a pound to one gallon of water should be mixed, it should be brought to boiling immediately after mixing, and if any is likely to remain, or if a mixed quantity is kept for use, a few drops of soluble "Phenyle" should be mixed in. This soap solution will be required, more especially for cleaning the insides of intermediates and thirds, and particularly upon the white upper panels.

CIRCULAR No. 41 OF 22ND JUNE 1889.

The washing of carriages undertaken by the Carriage Department from the 1st July, besides the work already done on axle boxes, buffers, drawgear, &c., will include the following:—

Washing thoroughly the whole of the outsides, brushing the insides, floor, cushions, sides, roof, hat nets, &c., cleaning the windows, venetians, and brass work, cleaning the lavatories and all lavatory fittings (except the closets, or hoppers which will be done by the sweepers employed by the Traffic Department to do all such work at stations), also any washing which may be necessary inside the carriage.

The water tanks in carriages are to be filled by the Traffic staff.

GREAT INDIAN PENINSULA RAILWAY.

CIRCULAR No. 109, OF 22ND JUNE 1894.

Trains running long distances on the main line require to be cleaned after each trip as under:—

A. Remove gratings from lavatories.

B. Thoroughly sweep hat nets, cushions, and floor with a soft hair hand brush, wash floor of bath room and oil cloth, and dry with a mop.

C. Close glass windows and wash sunshades, side and end panels, with long handled carriage cleaning brush, dipping brush frequently into a bucket of clean water. Thoroughly rinse off all dirty water. If sunshades and panels are very dirty, clean with a spoke brush and good hard bar soap, taking care to rinse off the whole of the soap before drying with a dungry towel. For the white panels of newly painted first class carriages use a sponge instead of spoke brush.

APPENDIX G.—(*continued.*)

D. Clean glass windows inside and out with damp sponge, and polish with chamois leather.

E. Thoroughly dust hat nets, venetians, mouldings, ceiling cloth, cushions, tables, &c., with a dungry duster. Do not use waste for this purpose. The ceiling cloth and gilt moulding will require to be cleaned occasionally with a sponge and cold water, after which it must be wiped dry with a chamois leather.

F. Polish washhand basin and brass door handles with bath-brick, and wipe perfectly clean with waste. The rest of the brass fittings are lacquered, and do not require polishing.

G. Wash gratings and replace in lavatories. Then wash frames, headstocks, and footboards with old brushes kept for this purpose only.

H. Clean screw couplings, side chains, and buffers with waste, and apply a little oil to the wearing surfaces.

2. As a general rule it should not be necessary to apply soap to the sunshades and panels of carriages oftener than once a month. Soft soap must on no account be used.

3. All vehicles standing spare should be kept clean and dusted, so that they may be attached to a train at a minute's notice.

4. Trains running locally or on branch lines do not require to be washed daily, but they should be swept and dusted after each trip, and washed once every three or four days as may be necessary.

5. For the floors only of road vans, brake vans, and horse boxes, a solution of one pound soft soap in three gallons of water may be used for scrubbing purposes. The floors of horse boxes or road vans, which have carried fish, should be washed out with carbolic acid and water.

OUDH AND ROHILKUND RAILWAY.

9. The inside of all coaching vehicles must be brushed out. The oil cloth of the first, and the wooden flooring of second, intermediate, and third class carriages must be scrubbed, soap being used if necessary. Washhand basins, brasswork, looking glasses and commodes to be thoroughly cleaned. The outside of vehicles to be washed with soap if required, sajji mutti must on no account be used. Axle boxes and springs, buffers and screw couplings to be well cleaned and oiled. Window glasses to be cleaned on both sides, and finally the vehicle is to be thoroughly dusted.

11. When a carriage is clean, it is on no account to be washed, but simply dusted or brushed down.

APPENDIX G.—(*continued.*)

EAST INDIAN RAILWAY.

70. The attention of Carriage Examiners is especially drawn to the washing and cleaning of coaching stock, and the following instructions are issued for guidance and strict observance:—

1. The inside of all coaching vehicles must be brushed out.

2. The oil cloth of the upper class and the wooden flooring of lower class carriages must be scrubbed, soap being used if necessary.

3. Washhand basins, brasswork, looking glasses and commodes to be thoroughly cleaned.

4. The outside of vehicles to be washed with soap if necessary, sajji mutti must on no account be used.

5. Axle boxes and springs, buffers and screw couplings to be well cleaned and oiled when necessary.

6. Window glasses to be cleaned on both sides and finally the vehicle to be thoroughly dusted.

SOUTHERN MAHRATTA RAILWAY.

Appendix E, Working Time Book.

1. (*a*) Before the cleaning of the exteriors of coaching vehicles is commenced, all windows or shutters and doors must be closed.

(*b*) The exteriors of first, second, and composite carriages to be cleaned with a sponge and clean water, hard soap may also be used when necessary. A soft broom and plenty of clean water to be used for the exteriors of all other coaching vehicles; if very dirty, a spoke brush and hard soap may be utilized. Soap must be always well washed off, as the exteriors of vehicles must be dried thereafter, the upper classes, with a chamois leather, and the others with a cloth.

(*c*) Glass windows to be cleaned, on both sides, with a damp sponge and afterwards polished with a chamois leather.

(*d*) Floors to be thoroughly swept and, when necessary, scrubbed and washed with a solution of soft soap and water, care being taken to remove all dirt from corners which are difficult of access; floors must be wiped dry after being washed.

APPENDIX G.—(*continued.*)

(*e*) Cushions to be brushed and rubbed with a duster, all dust to be removed from seams, special brushes and dusters are provided for this purpose and they are not to be used for floors or footboards; loose cushions to be taken out and the frames on which they rest to be cleaned; seams should be rubbed occasionally with dilute carbolic acid, which can be obtained, of the requisite strength, from the workshops. Waste is not to be used for cleaning cushions.

(*f*) Lavatory paint to be cleared with a damp cloth or, when necessary, with hard soap and water.

(*g*) Commodes to be thoroughly flushed and cleaned, the upper and lower covers to be examined and rubbed clean and dry on both sides; these fittings require special daily attention, and no vehicle must be allowed to run if there is an offensive smell from the commodes; Phenyle to be freely used whenever necessary. The drying of commode covers must always receive special attention.

(*h*) Washhand basins to be thoroughly cleaned and soap drips cleaned, all greasy stains to be removed, but the use of sand for this purpose is prohibited: pipe connections, plugs and cocks to be kept in good working order; plugs to be properly packed so that they work easily and allow no leakage.

(*i*) Tank connections to be kept perfectly tight and special attention to be directed to the condition of the clips used to support the pipes which deliver water to the commodes; these clips must always be firmly fixed so that the pipes may be securely held and the joints with the commode rings are so perforated and arranged, that water should be delivered over the whole of the inner surface thereof, and when this result is not obtained, the defect must at once be corrected.

(*j*) Windows and shutter frames, panels, tables, mouldings and generally the interiors of carriages, to be well rubbed with a damp cloth and finished with a chamois leather.

(*k*) Doors, shutters, ventilators and windows to work freely, the runs in the standing and door pillars in which the windows and shutter frames slide, may be occasionally dressed with black lead and tallow to facilitate movement, but care must be taken that the mixture is sparingly used and that the outer edges of the runs are afterwards well rubbed, so that any excess may be removed.

(*l*) Sliding seats, flap tables, folding beds, &c., to be kept in good working order.

(*m*) All polished fittings to be kept bright, clean and in good order; the too common practice of leaving dirty oil on the inner sides of door handles should be avoided.

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APPENDIX H.

On the Great Indian Peninsula there are two Managers for the Workshops, one for the Locomotive, and one for the Carriage and Wagon side.

On the Rajputana-Malwa there is a Chief Foreman in the Carriage and Wagon Shop.

On the Indian Midland, Oudh and Rohilkund, and in the East Indian Locomotive Shops there are Works Managers.

On the

Bombay, Baroda and Central India,
Rajputana-Malwa, in the Locomotive Shops,
Eastern Bengal,
Bengal-Nagpur,

Southern Mahratta; there are Assistant Locomotive Superintendents in charge of the Workshops. These officers and subordinates are in sole charge of the shops, devote their whole time to this work, having no other duties.

Where these officials are subordinates, they, together with the Foremen, are expected to keep the same working hours, as the men, being allowed to come not more than about 5 minutes after, and leave the same time before, the men.

Locomotive Workshops.	Name of Railways.									
	B. B. & C. I.	G. I. P.	I. M.	O. & R.	E. I.	E. B. B. G.	E. B. M. G.	B. N.	S. M.	S. I.
Erecting Shop Foreman	1	2	1	1	1	1	1	1	1	1
,, ,, ,, Assistant ...	...	...	...	1	2	...	...	...	...	...
Boiler ,, ,, ...	1	2	1	1	2	1	...	...	1	1
,, ,, ,, Assistant ...	...	...	...	...	1	...	...	...	1	...
Machine ,, ,, ...	1	1	...	...	1	1	...	1	1	1
,, ,, ,, Assistant ...	...	1	...	1	2	...	...	...	1	...
Smiths ,, ,, ...	1	2	...	...	1	1	1	1	1	1
,, ,, ,, Assistant ...	...	...	...	1	1	...	...	...	...	...
Foundry ,, ,, ...	1	1	1	1	1	1	...	1	1	1
,, ,, ,, Assistant ...	...	...	...	...	1	...	...	...	...	...
Fitting ,, ,, ...	...	1	...	...	1	...	...	...	...	...
,, ,, ,, Assistant ..	...	...	1	...	1	...	...	...	...	...
Wheel ,, ,, ...	...	1	...	...	...	...	...	...	...	...
Millwright ,, ,, ...	...	1	...	...	1	...	...	...	...	...
Yard ,, ,, ...	...	1	...	...	...	...	...	...	...	...
Tinsmiths' and Coppersmiths' Foreman ...	...	...	...	...	1	...	...	...	...	...
Interlocking Foreman	...	...	...	...	1	...	...	...	...	...

APPENDIX H.—(*continued.*)

Carriage and Wagon Workshops.	Name of Railways.									
	B. B. & C. I.	G. I. P.	I. M.	R. M. R.	O. & R.	E. B. B. G.	E. B. M. G.	B. N.	S. M.	S. I.
Carriage Building Shop Foreman ...	1	1	1	1	1	...	...1	1	1	1
,, ,, ,, ,, Assistant	...	...	1	1	1	...	...	1	...	1
,, Smiths' ,, ,, ...	...	1	...	1	...	...	...	...	...	...
,, Repair ,, ,, ...	...	1	...	...	...	...	...	...	...	...
Brake-van ,, ,, ,, ...	...	1	...	...	...	...	...	...	...	...
Wagon ,, ,, ,, ...	...	1	...	...	...	...	...	...	...	...
Lifting ,, ,, ...	...	1	...	...	...	...	...	...	...	...
Sawmill ,, ,, ...	1	1	...	...	...	1	...	...	...	...
Finishing and Painting Shop Foreman ...	1	1	...	1	1	1	...	...	...	...
Machine Shop Foreman	...	...	...	1	...	...	...	...	1	...
,, ,, ,, Assistant ...	...	...	...	1	...	...	...	...	...	...