M.R.O. 1—77,000—9-8-37.

(1) Number of pages_____

(2) Date of repair_____

(3) Initials of the Reference_____

MADRAS RECORD OFFICE.

Government of Madras.

[illegible] DEPARTMENT.

G.O. No. 2960 Press
548-47 Mis.

Dated 24-6 1847.

Not to be folded or roughly handled

No. 548. Read the following Circular from the Under Secretary to the Government of India, Public Works Department, (Railway,) to the Governments of Madras, Bombay, Punjab, and Chief Commissioner of Oudh, in the Public Works Department, Railway Branch, dated Simla, 31st May 1869, No. 10:—

REFERRING to Circular No. 9-R., dated 2nd September 1867, I am directed to forward, for the information of the Government of Madras and for communication to the Agents of Railway Companies, copies of correspondence* with the Government of Bengal having reference to a cylindrical waggon designed by the Agent of the Eastern Bengal Railway, and now in use on that line.

* From Government of Bengal, No. 938-G., dated 5th May 1869, and enclosures.
From Government of Bengal, No. 987-G., dated 13th May 1869, and enclosures.
To Government of Bengal, No. 630-R., dated 31st May 1869.

2. Special attention is called to these papers, and the Governor-General in Council again commends to the Government of Madras the very great importance of establishing a better proportion between the paying and dead load on Indian Railways.

No. 549. ORDER THEREON, 24th June 1869, No. 2,060.

RAILWAY, No. 38.

FORWARDED to the Consulting Engineer for Railways for communication to the Agents of the Madras and Great Southern of India Railways.

2. Major Shaw Stewart's particular attention will be drawn to paragraph 2.

(True Extract.)

Colonel, R. E.,
Secretary to Government.

To the Consulting Engineer for Railways, with ten copies of Tracing.

Ed. S. T. Augustin.

No. 938G., dated Fort William, the 5th May 1869.

From—Major J. HOVENDEN, R. E., Offg. Joint Secy. to the Govt. of Bengal, P. W. Dept., Railway Branch,

To—The Secretary to the Government of India, P. W. Dept.

IN reply to your letter No. 435R, dated 26th ultimo, I am directed to forward a copy of a letter noted in the margin from the Agent, Eastern Bengal Railway Company, submitting a report on the cylindrical wrought-iron wagon constructed by him, and now in use on the line.

No. 1645, dated 10th April 1869, with report and plan.

2. A note by the Officiating Consulting Engineer, who has inspected the wagon and watched its running, accompanies.

3. The Lieutenant-Governor recommends that the Agent's proposal to construct 80 wagons on this principle to the favorable consideration of the Government of India.

No. 1645, dated 10th April 1869.

From—F. PRESTAGE, Esq., Agent, Eastern Bengal Railway,

To—The Offg. Consg. Engr. to the Govt. of Bengal, Railway Dept.

I NOW have the honor to forward a memorandum showing the results attending the working of the cylindrical wrought-iron wagon, which is running on this railway, and which was run experimentally over the Calcutta and South-Eastern State Railway by the train we proceeded with to Canning on the 1st instant, and brought back loaded by the train we returned with on the following day.

The wagon therein alluded to has already run upwards of 1,000 miles, and it is arranged it shall continue to be run as often as possible. In the meantime what I would recommend for the sanction of Government, is that at the end of a month or when it has run, say 5,000 miles, if the Agency and Superintendent of Rolling Stock continue to report favorably on its working, a recommendation should be forwarded to the Board to arrange for the construction of the bodies and special fittings for 80 such wagons, sufficient to form two complete trains; and an effort should be made to despatch them to this country, and place them on the road by the time of the proposed opening of the Goalundo Extension at the end of February next, for very great advantage will be found in working them across the proposed ferry at the Goraie, and more particularly on account of the number of vehicles to be crossed being thus reduced more than one-half.

I would propose the cylindrical wagons should be constructed in lieu of, and forming part of, the remaining 100, for which we have the iron-work in this country, *vide* Indent 342C sanctioned by Government, and the construction of which has been deferred pending a settlement of this question, and I may remark I shall hope to be in England about the time the proposed reports on the working above referred to reach home, and I might thus be better able to explain and give on the spot any further information that may be needed by the Board.

I should further observe that, owing to the reduced cost of these wagons, it is estimated the amount still available under Indent 407C duly sanctioned by Government, will be sufficient to cover the cost of their construction, and all, therefore, that is sought from Government, is sanction for the altered design.

Referring to the memorandum, I would call particular attention to the largely increased load of straw conveyed by the cylindrical wagon as compared with the largest covered goods wagon on the Calcutta and South-Eastern State Railway; but as this is a matter which more especially affects that Railway, I will hereafter address you specifically on the subject.

Memorandum by F. PRESTAGE Esq., Agent E. B. Railway, showing the results attending the working of a cylindrical wrought-iron wagon.

The statement shows its tare, cubic content, and carrying capacity as compared with ordinary covered goods stock on this and on the Calcutta and South-Eastern State Railways.

	E. B. R. Stock.										C. & S. E. S. R. Stock.									
	Covered Goods originally sent from England.					Enlarged ditto made in this country.					Largest Covered Goods Wagons.					Cylindrical Wagon.				
		Ton.	Cwt.	qr.	lbs.		Ton.	Cwt.	qr.	lb.		Ton.	Cwt.	qr.	lbs.		Ton.	Cwt.	qr.	lb.
Tare	...	5	9	2	0	.....	6	12	2	0	.....	6	2	0	0	.....	5	17	0	0
Cubic Con.	675	...	...	...	...	1069	...	...	...	...	812	...	...	...	...	1,575c. ft.				
Load		3	9	0	0	.....	4	18	0	0	.....	...	...	...	...	.....	9	0	0	0
Loose Jute	...	...	...	...	...	.....	2	2	3	12	.....	...	...	...	...	.....	3	8	2	4
Loose Cotton	...	3	15	0	0	.....	5	9	0	0	.....	...	...	...	...	.....	9	18	0	0
Gunnies	...	...	...	...	...	.....	...	...	...	...	.....	2	0	3	0	.....	4	5	3	0
Straw	...	...	...	...	...		...	...	...	...										
Grain, Salt, Coal, & such goods.		6	16	0	0	.....	9	3	2	0	.....	6	0	0	0	.....	9	18	0	0

* *T. Cwt.*
9 8 *was on one occassion carried down from Koostea.*

The body of the wagon is 9' 10" diameter, and 21 feet long,—length over all 24'-4½," and wheel base 13 feet, but judging from the rigidity of the body, the Superintendent of Rolling Stock concurs with me in thinking it can with advantage be increased in width and height to the standard of maximum moving dimensions, *viz.*, 10' 6" in width, and 13' 2" above rails, and further, that the bottom or rather as will be seen by the Drawing to 13' 2" above rails, and further, that the bottom of the wagon can be brought down another 8," and by which its sectional area will be increased from 75 to 95 surficial feet; this will enable us to reduce its length to 17' 6" and obtain the cubic contents required to stov 10 tons of jute in drums, (1,750 ch. ft.) the carrying capacity of the Wagon has been further increased 76 cubic feet by making the ends concave. These and other slight modifications, and which it is thought can with advantage be made in construction, will, it is estimated reduce the tare of such a wagon to five tons, or half the weight of the paying load if of jute, and less than half if of grain, Salt, Coal, and such goods, of which it would carry 10 ons 16 cwt.

It is worthy of consideration whether the body could not with advantage be made of steel plates instead of iron, by which its weight would be further reduced some 25 per cent. or about half a ton, and the paying load further increased to that extent, but this is a question which can best be considered and determined in England.

There cannot, I believe, be any difference of opinion as to the great importance of reducing the dead weight of rolling stock, if it can be one without impairing efficiency; but at the same time, I set forth the following as some of theadvantages to be gained, if it is found there is no serious objection to the introduction of uch stock: but before doing so, I would wish to point out that all the running and working parts are the same as are in use on this railway:— and before I go further, I would wish to remark that the following calculations have reference to the carriage of jute in drums, of which w carried last year 15,00,000 maunds, forming 41 per cent. of our goods traffic, and which, it is reasonably hoped, will very considerably increase upon opening of the line to Goalund; at the same time I shall also try to show such a wagon is better adapted than the present covered goods stock for carrying coal, also grain and salt in bulk, considerations nest in order of importance.

Advantages.

Construction.

The prime cost is less, our Locomotive Superintendent estimating the cost of such a wagon at Rs. 1,300 as against Rs. 1,723, the cost of the ordinary covered goods; but as one which wagon will carry the load of two of the ordinary kind, it is manifest the outlay on such stock will be reduced much more than half. In fact the number of wagons required to bring down 10,000 maunds of jute per day from Goalundo would be reduced from 165 to 80, and the outlay on the same from £28,422 to £10,400. The outlay on Goods Locomotives would also be reduced nearly half, and the length o sidings and goods sheds may also be reduced, thus showing also a considerable saving in this drection.

Maintenance.

Less than half the quantity of stock would have to be maintained, and the body of the wagon being entirely of wrought-iron, and forming, as it does, one rigid shell, will no doubt be much more durable and better stand the shocks and concussions such stock is liable to, and there can be no doubt the life of such a wagon will be proved to be very much greater than that of any such vehicle built entirey of Timber. (Experience is proving that the coal wagons on this railway with iron bodies as reconstructed by our Superintendent of Rolling Stock are much more duarable than those built of timber, also that plate Iron is the only material with which we can make a really sound roof for our covered stock.) Its durability will, it is also thought, be still further and very considerably increased by the tie bar which passes through the wagon, tieing both head stocks or buffer beams securely together, and by which that very trying strain caused at starting is distributed from the tie bar of one wagon to the other, instead of, as at present, being in the first instance brought on to the sole bars or side timbers, and more or less on the body of the wagons themselves.

Considerable saving would also be shown in the wear und tear and maintenance of permanent way, from the reduced number of vehicles run over the road, and from only half the number of goods engines having to be maintained.

Working.

This is where the greatest gain would be shown; little more than half the number of trains would have to be run (the proportion may be taken at 13 to 24); little more than half the number of engine drivers, firemen, and guards employed; watering and greasing would cost very much less; the regularity of working increased, and the risk reduced, particularly on single lines from the reduced number of trains.

There are other great advantages, the next greatest being that arising from the saving in power caused by less resistance to wind: there can be no doubt that the resistance offered by a comparatively smooth cylinder with concave ends being dragged through the air will be very much less, it is estimated at 34 per cent. than that of a plane with numerous obstructions at right angles, such as the vertical sides, ends, and projecting pillars of our ordinary wagons present. Our Locomotive Superintendent has represented, and I have observed on this railway, that the locomotives often labour as much, and burn as much fuel with 50 empty wagon, as with 40 loaded; trains upon embankments have often been brought to a stand still, and one case was reported of a train between Ramnugger and Muttearee being driven back by wind.

Such wagons would also be much less likely to take fire, or become leaky; the latter is a serious evil with our present stock, and caus us at times to pay heavy compensation claims during the rains.

From the space between the sole bars being made available, and the bottoms of the wagons being only 1' 10" above rails, instead of 4' 3" the centre of gravity of such a wagon, both when light and when loaded, is brought down. It should be noted that, although we have succeeded in gaining some 15 per cent. of the carrying capacity below the ordinary level of the beds of wagons, yet, as far as we can judge in practice, about 20 per cent. of the load is carried and gained in that space. This arises from the form of the wagon, which causes the upper part of the load to impinge on and compress the lower. The lower part of the load is also made much more compact from the men walking over it whilst loading. There can be no doubt the cylindrical or some such form presenting no acute angles, is best suited for stowing fibres and particularly loose jute or cotton; at any rate we have this fact, that with our present wagons, which, but for the roofs would be rectangular, only 10¼ lbs. of jute can be stowed per cubic foot, whilst with the cylindrical wagon close on 13 lbs. can be stowed in the same space. This great difference, in addition to the above reasons, is to a considerable extent owing to the form of the roof: it often happens with our present wagons, nearly sufficient space to stow an additional tier of drums is lost, owing to the roofs not being designed to stand upwards pressure, and the difficulty of forcing them in is very much increased by the projecting ribs which carry the roof.

It is hardly necessary to adduce figures to demonstrate what we are urging, but the following shows the saving in outlay and the results of working a train with the present and proposed wagons:—

Present Wagons.			Proposed Wagons.	
No. of Wagons 39.			No. of Wagons 35.	
Tare of ditto	Tons	258	Tare of ditto	Tons 175
Load ditto	„	191	Load ditto	„ 350
Gross load exclusive of break van	„	449	Gross load exclusive of break van	„ 525
Gross earnings	Rs.	1,337	Gross earnings	Rs. 2,450
Earnings per train per mile at present rates	„	11·93	Earnings per train per mile at present rates	„ 21·05

It will be noted the load hauled by the engine hauling the new wagons is increased to 525 tons; this our Locomotive Superintendent thinks may fairly be taken as the increased load, and no doubt it may be, owing to the reduced number of vehicles that have to be put in motion, also owing to the less resistance due from wind, both from the form of the vehicles and their reduced number.

By carrying the foregoing increased proportion of paying load, it appears that jute can be carried from Goalundo to Calcutta at the rate now charged from Kooshtea, *viz.*, four annas per maund, and the trains would even then yield Rs. 16 per mile, or 34 per cent. more than they now do from Kooshtea.

There will, I think and hope, be no necessity to make such a proportionate reduction in the through charge, and I have no doubt that, during the months of June, July, August, September, and October, 6 annas per maund will be obtained, and for November and December 5 annas; and if this does not kill the boat competition, it will, I think, be wise to reduce to 4 annas for the remaining five months; at any rte it will put the railway in a most favorable position to compete with boats and steamers, and it should enable it to divert nearly the whole of the jute trade over this line; at any rate all hat large portion which now passes Goalundo. and which, if taken at 40 lakhs per annum, and at an average of 5 annas, will yield £125,000 gross, and if the working expenses are taken at 40 per cent., and which under the altered circumstances I am confident they may be, tle net return from this traffic alone would equal £75,000 a year.

In case it may be urged that the proper course is to reduce the bulk, and thus increase the density of the jute before we receive it, I should mention that all our efforts in this direction have failed: both the native consignors and the purchasers and exporters in Calcutta being strongly opposed to such a course, although every reasonable encouragement has been offered them. The fact is the latter are willing to pay more if they can select their jute and cotton on the spot near their own establishments and when loose and it can be best inspected; and it must be apparent that if the loose material can be carried, as I hope I have shown it can be, in the new stock at less cost than screwed bales in the ordinary stock, there is every reason why the Company should secure the additonal rate and make it to the interest of all parties to keep things as they are; besides there is no doubt reducing bulk would, under the present, and certainly under the proposed altered, circumstances, benefit the boats much more than us.

As to the suitability of such a wagon for carrying coal, salt, or grain in bulk, the difficulty we find in carrying such goods in our covered goods wagons and which are not intended for the purpose, is that a flap or board has to be placed across the doorway to prevent the load bearing against the sliding doors, and which is awkward for loading and unloading.

With the cylindrical about 6 tons of the load would be carried below the level of the doorways, and the balance of 4 tons could be piled up in the centre and at the ends, so as not to bear in any way against the doors.

If a wagon was designed specially for bringing down grain in bulk, and taking up salt or coal, such a traffic could no doubt be worked most economically in a wagon of much less capacity, the roof being only some 9 feet above rails, by which another 12 or 15 cwt. would be saved in tare and gained in paying load, but I think for many reasons with such stock it would be found desirable to retain the segmental bottom and continuous tie bar, which I may here observe would be found to be no obstruction in carrying such goods, and in practice is found to be an advantage in loading cotton and jute, in so far that it necessitates the loaders starting the loading with regularity.

Having so far turned our attention to the carrying at less cost the traffic in fibres which flows most naturally to this railway, we should I think, now make further efforts to divert the enormous traffic in grain which passes Goalundo and Kooshtea, and of which up to September last we had only succeeded in diverting some 30 per cent. of the quantity produced in Eastern Bengal, a very large proportion of which passe our present or proposed terminus.

This is a subject that has often had my attention, and after full consideration I am of opinon the first step to be taken is to reduce the dead weight of the covered goods stock in the manner or some such manner as that proposed, not only that the paying load may be increased, but that the grain may be carried in bulk without that loss which arises either from all timber vehicles (unless unusually sound and tight), or from peculation or exposure to wind and weather arising from carrying it in open trucks.

The next step is to reduce the cost of carting and handling as much as possible at this terminus, and this, I think, can be best accomplished by running the wagons over drops, by which their contents will be dropped into godowns, which should be let at moderate rents. Appliances of this kind should, I think, form part of the arrangement of our proposed new terminus at Chitpore, where the godowns would I think, be readily taken up.

I am convinced this or some such arrangement is the best to be carried out, and with such moderate rates as could then be charged, there is no reason why the grain traffic of this country should not be as heavy and regular as the traffic of minerals in Europe.

The numerous official letters circulated by the orders of the Government of India, and more particularly Circular No. 9R., dated Simla, 2nd September 1867, and Colonel Strachey's letter dated so late as the 15th ultimo, prove the interest the officers of Government have taken in this important and interesting question; and in fact, that they have taken the lead in trying to bring about the change so much needed, and I hope it will be thought we have now gone some way towards giving practical effect to their views.

Note by Major J. Hovenden, R. E., Officiating Consulting Engineer to Government of Bengal, Railway Department, on the cylindrical wrought-iron wagon constructed by Mr. Prestage, and now in use on the Eastern Bengal Railway,—dated 4th May 1869.

I have carefully inspected Mr. Prestage's new cylindrical wagon, and I have watched it while running both loaded and empty. There appears no doubt that the principle on which it is constructed is admirably adapted for the special work for which it is intended, namely, for the carriage of unscrewed jute. I do not agree with Mr. Prestage in thinking that it is equally well adapted for the carriage of grain in bulk. The present wagon is a experiment. It weighs (to the best of my recollection) five tons, seventeen hundred weight, and carries nine tons of unscrewed jute. By a few modifications in construction, Mr. Prestage will probably get a wagon weighing five tons, and capable of carrying ten tons of jute. The cylindrical form has been adopted as being best adapted for packing unscrewed jute, which is brought down in the shape of drums.

The chief objections to the wagon are the want of cross bracing; this has to be left out, owing to the body of the wagon extending below the sole bars. The experimental wagon does not show any signs of giving yet, but I cannot help feeling that this is a serious defect.

The draw-spring to the through tie-bars is not sufficient. At present this is a disc of Indian rubber, and it does not work in a satisfactory manner. The substitution of a volute spring would probably remedy this defect.

The cylinder is only kept in shape by ribs of angle iron. These appear to answer the purpose well when the wagon is filled up with unscrewed fibres or straw, but I think that a heavy load of grain in bulk or coal at the bottom of the wagon would force it out of shape.

The doors are at the ends of the wagon, and not in the centre. Mr. Prestage agrees that this is a mistake. When Mr. Prestage talks of lowering the centre of gravity of wagons, it must be understood that he is comparing the new wagons with the large rectangular wagons which he built specially for the jute trade. The centre of gravity of his new wagons is still higher than that of the East Indian Railway wagons.

I fear Mr. Prestage will find it difficult to work his goods trains with screw couplings, unless he gets more powerful engines.

On the whole, I think that this wagon, with a few slight modification, is well adapted for the jute traffic on the Eastern Bengal Railway. The Agency, East Indian Railway, do not propose to adopt it at present. They do not want to carry loose cotton if they can help it, and they can put more screwed cotton into their present wagons than the axles will carry.

No. 987G., dated Fort William, the 13th May 1869.

From—Major J. Hovenden, R. E., Offg. Joint Secy. to the Govt. of Bengal, P. W. Dept., Railway Branch,

To—The Secretary to the Government of India, P. W. Dept.

In continuation of this office letter No. 938G, dated 5th instant, I am directed to forward a copy of a further communication noted on the margin from the Agent, Eastern Bengal Railway Company, submitting reports by the Consulting Engineer of the Company in India, and the Superintendent of Rolling Stock, on the new cylindrical wrought-iron wagon, and soliciting permission to indent for 80 such wagons to be obtained from England in time for the opening of the extension line to Goalundo.

No. 2054, dated 8th May, and enclosure.

2. This proposal has already been recommended to the favorable consideration of the Government of India.

3. The Consulting Engineer, I am to add, adheres to the views expressed by him on the subject of cross bracing and draw bars.

No. 2054, dated 8th May 1869.

From—F. Prestage, Esq., Agent, Eastern Bengal Railway,

To—The Offg. Consulting Engineer to the Govt. of Bengal, Railway Dept.

I have the honor to invite your attention to my letter No. 1645, dated the 10th ultimo, with which I forwarded a memorandum showing the results attending the working of a cylindrical wrought iron wagon which is running on this Railway, and wherein I recommended that if the officers concerned continued to report favorably on its working, a recommendation should be forwarded to the Board to arrange for the construction of the bodies and special fittings for 80 such wagons sufficient to form two complete trains, and an effort should be made to despatch them to this country and place them on the road by the time of the proposed opening of the Goalundo Extension at the end of February next. The opinions expressed in the accompanying reports* by the Company's Consulting Engineer in India, and by the Superintendent of Rolling Stock, so fully enforse my own that I think it needless to wait longer before asking for sanction to send forward the necessary indent to England, and which I now have the honor to do.

* Copies of our letters Nos. 1888 and 1889, with report No. 1090, from Consulting Engineer in India. Report No. 1356, from Superintendent of Rolling Stock.

I am glad to report that during the ten trips already run by the new wagon, it has earned Rs. 579-14-0 as against Rs. 305-10-0, the amount earned in the same number of trips by one of our largest ordinary covered goods wagons carrying the same description of goods. This is a most significant fact bearing out what I have set forth in my memorandum before referred to. There is some slight difference of opinion between Mr. Leslie and Mr. Hindmarsh as to some of the details, but these will be of assistance in finally considering and deciding the matter in England.

No. 1888, dated 28th April 1869.

From—F. Prestage, Esq., Agent, Eastern Bengal Railway,

To—The Consulting Engineer in India.

Some little time since I handed you a printed copy of my memorandum showing the results attending the working of a cylindrical wrought iron wagon, dated the 10th instant, and during your stay in Calcutta, you have, I believe, examined the wagon referred to.

I shall now be obliged by your favoring me with your opinion on the following points:—

First.—With the facts before you, do you think any other form of wagon would be more suitable for the purposes proposed?

Second.—Do you see any serious objection to increasing the width and height of wagon to the standard of maximum moving dimensions, as proposed in paragraph 2 of my memorandum? In judging of this, you will, no doubt, bear in mind the advantage of reducing the length of the vehicle, not only from its reducing the length of the train, but also from its shortening the body and sole bars, and thus increasing its strength.

Third.—The object of having the door at the end no longer existing, and it being considered most desirable to have them at the sides, what kind of door would you recommend? It should be borne in mind the opening need not be larger than 4 feet by 4 feet, or sufficient to take in a bale of loose cotton, but care must be taken that all joints may be as water-tight as possible.

Fourth.—Do you think any advantage would be gained from making the plates of the body lighter or from corrugating them?

Fifth.—Would you recommend that the sole bars be of iron or of timber?

Sixth.—Do you, or do you not, think the draw bar and buffing arrangements better than that of our ordinary stock, and from this modification, and the body and load being brought down nearer the draw bar level; also from the body of the wagon being entirely of iron, do you not think the life of such a vehicle would be much greater than that of the ordinary covered goods stock?

Seventh.—As I verbally mentioned on a previous occasion for the satisfaction of Major Hovenden and of Mr. Sibley, one of the members of the Board of Agency (East Indian Railway), this wagon was on the 19th instant loaded with 12 tons of rice in bulk, and then shunted and placed foremost in a goods train, and otherwise worked in this yard, as the latter gentleman when discussing the subject the previous week, thought such a load would cause the sole bars to spread out:—It was however proved, as might have been expected that they came together nearly to the extent of one-sixteenth, which could in no way affect the stability or running of the wagon, 5 tons 9 cwt. of the load was stowed below the ordinary platform level.

I shall, of course, be glad to receive any suggestions or remarks on any other points that may occur to you, and if you could conveniently let me have your reply early next week, I shall be obliged.

No. 1889, dated 28th April 1869.

From—F. Prestage, Esq., Agent, Eastern Bengal Railway,

To—The Superintendent of Rolling Stock.

Some little time since, I handed you a printed copy of my memorandum showing the results attending the working of a cylindrical wrought iron wagon, dated the 10th instant, and during your stay in Calcutta, you have, I believe, examined the wagon referred to.

I shall now be obliged by your favoring me with your opinion on the following points:—

First.—With the facts before you, do you think any other form of wagon would be more suitable for the purposes proposed?

Second.—Do you see any serious objection to increasing the width and height of wagon to the standard of maximum moving dimensions as proposed in para. 2 of my memorandum? In judging of this, you will no doubt bear in mind the advantage of reducing the length of the vehicle, not only from its reducing the length of the train, but also from its shortening the body and sole bars, and thus increasing its strength.

Third.—The object of having the door at the end no longer existing, and it being considered most desirable to have them at the sides, what kind of door would you recommend? It should be borne in mind the opening need not be larger than 4 feet by 4 feet, or sufficient to take in a bale of loose cotton, but care must be taken that all joints may be as water-tight as possible.

Fourth.—Do you think any advantage would be gained from making the plates of the body lighter or from corrugating them?

Fifth.—Do you recommend that the sole bars be of iron or of timber?

Sixth.—Do you, or do you not, think the draw bar and buffing arrangements better than that of our ordinary stock, and from this modification, and the body and load being brought down nearer the draw bar level, also from the body of the wagon being entirely of iron, do you not think the life of such a vehicle would be much greater than that of the ordinary covered goods stock?

Seventh (1).—As I verbally mentioned on a previous occasion, for the satisfaction of Major Hovenden and of Mr. Sibley, one of the members of the Board of Agency (East Indian Railway), this wagon was on the 19th instant loaded with 12 tons of rice in bulk, and then shunted and placed foremost in a goods train, and otherwise worked in this yard, as the latter gentleman, when discussing the subject the previous week, thought such a load would cause the sole bars to spread out; it was however proved, as might have been expected, that they came together nearly to the extent of one-sixteenth which could in no way affect the stability or running of the wagon, 5 tons 9 cwt. of the load was stowed below the ordinary platform level.

Seventh (2).—Your opinion as to the advisability of substituting screw couplings for the present coupling chains.

Mr. Sibley concurs with us in thinking an endeavour should be made to bring about this change, if it does not seriously limit the hauling power of the locomotives.

I shall, of course, be glad to receive any suggestions or remarks on any other points that may occur to you, and if you could conveniently let me have your reply early next week, I shall be obliged.

No. 1090, dated 4th May 1869.

From—Bradford Leslie, Esq. Consulting Engineer in India,

To—The Agent, Eastern Bengal Railway.

I have to acknowledge the receipt of your No. 1888 of the 28th ultimo.

I cannot say that I have had an opportunity of thoroughly examining the cylindrical wrought iron wagon, but I saw sufficient to enable me to comprehend the principles aimed at in its construction, and it appears to be well adapted to fulfil the conditions of the traffic it is designed to accommodate.

For carrying drums of jute, gram, salt, coal or lime, there is no doubt the circular section is the strongest, and requires the minimum amount of stiffening, for carrying tea boxes, piece goods or pressed jute, there would be some loss of space in a circular wagon, but of course it would always carry a full load of either. As regards the increase of the width of the wagon to the standard of maximum moving dimensions, I do not know of any objection; on the contrary I should think it an advantage,—it might involve an alteration in the position of the side lights on the last carriage of the train. *Thirdly*, as regards the doors, there is no doubt these should be at the sides. I should recommend that the doors should be not less than 4' 6" wide by 5' high. The best kind of doors and least liable to damage, I am of opinion, would be single sliding doors working on rollers travelling on edge rails at the level of the sole bars, and suspended by eyes working on horizontal round iron bars at the sides of the doorway, and a sheet iron cornice with a curtain or canopy to protect the joint at the top of the doorway. The doors should be made perfectly smooth inside so as to facilitate closing the door on a full load. *Fourthly*, I do not think that any advantage would be gained by making the plates of the body lighter or from using corrugated iron. I think the inside of the wagon should be made perfectly smooth. *Fifthly*, I should decidedly recommend that the sole bars should be of iron. Where timber and iron are used together, it is found that the iron expands, and wood shrinks and contracts with the heat, and in cold wet weather the iron contracts, and the wood swells and expands, so that the fastenings soon work loose. *Sixthly*, as regards the draw bar and buffing arrangements, I have not seen enough of the working of the wagon to enable me to say whether it is or is not better than that of the ordinary stock, but it appears to me to be more simple and better calculated to resist the shock of starting and stopping in long trains. I am not quite satisfied that the through draw bar is necessary; if an iron framing is used, the ends of the framing should have sufficient transverse strength to transmit the traction through the sole bars, and I think it would be an advantage to dispense with the draw bar through the space for stowage but I have no doubt that the depression of the centre of gravity due to the curved form of the bottom of the wagon by which the load is brought nearer the level of traction, will greatly reduce the straining of the wagon and add to the life of such a vehicle. With regard to the seventh clause of your letter, I think that if the sole bars are of iron of a strong horizontal section, there is no danger of the heavy load in the bottom of the wagon causing them to spring in; but even if this were the case, one or two angle iron ribs under the bottom would give the necessary stiffness; indeed, I should think it would be a good thing to have a pair of angle or ⊥ iron ribs right round the body of the wagon one on each side of the doorway.

As regards horizontal diagonal bracing to resist oblique strains in going round sharp curves, I think the bottom of the body of the wagon will act as a web plate, and therefore it might be

advisable to make it a little thicker than the sides and top. The curved form of the floor of the wagon would be well adapted for discharging coal or grain in bulk by means of circular openings or hoppers near the centre of the wagon.

No. 1356, dated 7th May 1869.

From—Thos. Hindmarsh, Esq., *Locomotive Superintendent,*
To—*The Agent, Eastern Bengal Railway.*

In reply to your No. 1889 of 28th ultimo, with reference to the modifications proposed to be made to the wrought iron cylindrical wagons, I beg to offer the following remarks :—

1*st*—Judging from the experience we have had in working the new cylindrical wagon, I do not think any class of wagon could be designed more suitable for the jute traffic on this line.

2*nd*.—The only objection which could, in my opinion, be offered to the wagon being increased in height and width, would be in carrying the sole bars so much outside of the centre buffer line, but there should be no difficulty in compensating for this by substituting sissoo wood for teak for the head stock or buffer beam, and by securing the head stock and sole bars by strong corner plates as shown in the accompanying drawing.

3*rd*.—The doors should, I think, be placed on the sides of the wagon, instead of the end, as shown in the accompanying tracing.

4*th*.—If the proposed modified form of vagon is adopted, I think the body could be made of lighter plates, the use of stee No. 14WG could with advantage be used; it would reduce the weight of the vagon about 9 cwts., corrugated iron would not answer so well for the purpose.

5*th*.—There would be nothing to prevent the under-frame being made of malleable iron, but I think it would not stand the concussion so well as timber.

6*th*.—I am of opinion the draw bar and buffing arrangements are ample for the safety of the wagon, and barring accidents from collision or other causes, they will, in my opinion, stand as much rough usage as the ordinary goods stock.

7*th*.—The substitution of screw couplings for the present coupling chains would be advantageous, as they would shorten the train, and there would be less chance of the driver's starting rashly, thereby more or less straining the wagons. I, at first, thought this might limit the hauling power of the engine, but I find from an experiment which I made yesterday, with a train of 35 wagons of coal, containing 9 tons in each wagon, that such is not the case. The wagons were all tightly coupled up buffer to buffer, and the engine to all appearance started the train with as much ease as with the ordinary sack chain. The following is Driver J. Dow's report on the subject: "No. 1 up-train pulled much easier with the short couplings and without the usual jerking; arrived at Kooshtea right time."

No. 630 R, dated Simla, the 31st May 1869.

From—Col. R. Strachey, R.E., Offg. Secy. to the Govt. of India, P. W. Dept.,
To—The Offg. Joint Secy. to the Govt. of Bengal, in the P. W. Dept., Railway Branch.

I am directed to acknowledge the receipt of your No. 938 G., dated the 5th May 1869, with copy of a letter from the Agent, Eastern Bengal Railway, and report on the cylindrical wrought-iron wagon designed by him and now in use on the line, together with a note thereon by the Officiating Consulting Engineer; also, of your letter No. 987 G., dated 13th May 1869, with further papers on the subject.

2. In reply, I am directed to communicate the sanction of the Governor General in Council to the Agent's proposal to construct 80 wagons on this principle. I am to request also that an expression of the satisfaction of the Government of India may be communicated to Mr. Prestage for the attention he has given to this subject.

3. Referring to the doubt suggested by the Consulting Engineer, it is probable that the lower part of the cylinder, if firmly fixed to the longitudinal main frame pieces, will fulfil the duty of the cross bracing of the ordinary

wagon, but it may be necessary to adopt Mr. Leslie's suggestion to make the bottom of the wagon somewhat thicker than the sides and top.

4. It will of course be necessary to be careful that the standard moving dimensions adopted for Indian Railways are attended to in determining all the proportions of the new wagon.

5. Referring to the concluding paragraph of the Consulting Engineer's note of the 4th May, I am to request the submission of a special report on the nature and dimensions of the axles and springs of the goods vehicles of the Eastern Bengal Railway as compared to those of the East Indian Line, and how the former can carry between 9 and 10 tons on 4 wheels when the latter cannot.

Pub Works Deptt

No 2060 2060

Proceedings of the Madras Government
Under date the 24th June 1869
Read the following

From the Offg Secy to the Govt of India & H & E No 10 of 31st May 1869.

Forwarded to the
Consulting Engineer for
Railways for communica-
tion to the Agents of the
Madras and Great
Southern of India Railways
Major Shaw Stewart's
particular attention will
be drawn to para 2.

To Under Secy Pub Works Railways.

Recd 25/6/69 Desp 30/6/69

Rec 2453

Govt. of {1869} Madras.

PUBLIC WORKS.

To The Consulting Engineer for Railways

Dated

Recd. Encl. 2

G. O. 24 June 1869, No. 2060

Nos. 548-549

Cylindrical Wagons (Ry)

Circular for the safety and instructions relative to a Cylindrical Wagon designed by the Agent of the Eastern Bengal Ry and now in use on that line. Civil Officers concerned with instructions.

16 June 1869