



REPORT
OF THE
EAST INDIAN RAILWAY ACCIDENTS TRIBUNAL
1939

List of Agents in India from whom Government of India Publications are available.

(a) PROVINCIAL GOVERNMENT BOOK DEPOTS.

MADRAS :—Superintendent, Government Press, Mount Road, Madras.
BOMBAY :—Superintendent, Government Printing and Stationery, Queen's Road, Bombay.
SIND :—Manager, Sind Government Book Depot and Record Office, Karachi (Sadar).
UNITED PROVINCES :—Superintendent, Printing and Stationery, U. P., Allahabad.
PUNJAB :—Superintendent, Government Printing, Punjab, Lahore.
CENTRAL PROVINCES :—Superintendent, Government Printing, Central Provinces, Nagpur.
ASSAM :—Superintendent, Assam Secretariat Press, Shillong.
BHAR :—Superintendent, Government Printing, R. O. Gulzarbagh, Patna.
NORTH-WEST FRONTIER PROVINCE :—Manager, Government Printing and Stationery, Peshawar.
ORISSA :—Press Officer, Secretariat, Cuttack.

(b) PRIVATE BOOK-SELLERS.

<p>Aero Stores, Karachi.* Bantbiya & Co., Ltd., Station Road, Ajmer. Bengal Flying Club, Dum Dum Cantt.* Bhawnani & Sons, New Delhi. Bombay Book Depot, Charni Road, Girgaon, Bombay. Book Company, Calcutta. Booklover's Resort, Taikad, Trivandrum, South India. Burma Book Club, Ltd., Rangoon. Cambridge Book Co., Booksellers, New Dak Bungalow Road, Patna. Chatterjee & Co., 3, Bacharam Chatterjee Lane, Calcutta. Chukerverty, Chatterjee & Co., Ltd., 13, College Square, Calcutta. Das Gupta & Co., 54/3, College Street, Calcutta. Dastane Bros., Home Service, 456, Raviwar Peth, Poona 2. Delhi and U. P. Flying Club, Ltd., Delhi.* Deshmukh Book Depot, Station Road, Sholapur. English Book Depot, Ferozeshpora. English Bookstall, Karachi. English Book Store, Abbottabad, N.-W. F. P. Faqir Chand Marwah, Peshawar Cantonment. Higginbothams, Madras. Hindu Library, 137/F, Balaram De Street, Calcutta. H. L. College of Commerce, Co-operative Stores, Ltd., Ahmedabad. Hyderabad Book Depot, Chaderghat, Hyderabad (Deccan). Ideal Book Depot, Rajpur Road, Dehra Dun. Imperial Publishing Coy., Lahore. Indian Army Book Depot, Dayalbagh, Agra. Indian Army Book Depot, Daryaganj, Delhi. Indian School Supply Depot, Central Avenue South, P. O. Dharamtala, Calcutta. International Book Service, Poona 4. Jains & Bros., Mori Gate, Delhi and Connaught Place, New Delhi, Messrs. J. M. Kamala Book Depot, 15, College Square, Calcutta. Keale & Co., 65, Britto Road, Karachi, Sadar. Kitabistan, 17-A, City Road, Allahabad. Kriahnaswami & Co., Teppakulam F. O., Trichinopoly Fort, Messrs. S. S. Lahiri & Co., Ltd., Calcutta, Messrs. S. K. London Book Co. (India), Arbab Road, Peshawar, Murree, Nowshera, Rawalpindi. Malhotra & Co., Post Box No. 94, Lahore, Messrs. U. P. Mathur & Co., Messrs. B. S., Chatur Vilas, Paota, Civil Lines, Jodhpur (Rajputana).</p>	<p>Minerva Book Shop, Anarkali Street, Lahore. Modern Book Depot, Bazar Road, Sialkot Cantt. Mohanlal Dossabhai Shah, Rajkot. Mohendra Bros., Lashkar, Gwalior State, Messrs. New Book Co., "Kitab Mahal", 192, Hornby Road, Bombay. Newman & Co., Ltd., Calcutta, Messrs. W. Oxford Book and Stationery Company, Delhi, Lahore, Simla, Meerut and Calcutta. Parikh & Co., Baroda, Messrs. B. Pioneer Book Supply Co., 20, Shib Narayan Daa Lane, Calcutta and 219, Cloth Market, Delhi. Popular Book Depot, Grant Road, Bombay. Punjab Religious Book Society, Lahore. Raghunath Prasad & Sons, Patna City. Rama Krishna & Sons, Bookellers, Anarkali, Lahore. Ram Krishna Bros., Opposite Bishrambag, Poona City. Ramash Book Depot and Stationery Mart, Kashmere Gate, Delhi. Ray & Sons, 43, K. & L. Edwardes Road, Rawalpindi, Murree and Peshawar, Messrs. J. Roy Chowdhury & Co., 72, Harrison Road, Calcutta, Messrs. N. M. Saraswati Book Depot, 15, Lady Hardinge Road, New Delhi. Sarcar & Sons, 15, College Square, Calcutta, Messrs. M. C. Sharada Mandir Ltd., Nai Sarak, Delhi. Standard Bookstall, Karachi. Standard Bookstall, Quetta. Standard Book Depot, Lahore, Delhi and Simla. Standard Law Book Society, 79/1, Harrison Road, Calcutta. Tara & Sons, Razmak (India), Messrs. B. S. Taraporevala Sons & Co., Bombay, Messrs. D. B. Thacker & Co., Ltd., Bombay. Thacker, Spink & Co., (1933), Ltd., Calcutta. Tripathi & Co., Booksellers, Princes Street, Kalbadevi Road, Bombay, Messrs. N. M. Uberoy, J. C., Journalist, Printer and Publisher, Jaycee House, Alexandra Road, Ambala. University Book Agency, Kachari Road, Lahore. Upper India Publishing House, Ltd., Literature Palace, Amnuddaula Park, Lucknow. Varadachary & Co., Madras, Messrs. P. Venkatasubban, A., Law Bookseller, Vellore. Wheeler & Co., Allahabad, Calcutta and Bombay, Messrs. A. H. Young Man & Co. (Regd.), Egerton Road, Delhi.</p>
--	--

* Agent for publications on Aviation only.

TABLE OF CONTENTS.

	PAGE.
Report of the Tribunal	1—10
Appendix I	20
Appendix II	21 & 22
Appendix III	23 & 24
Appendix IV	25 & 26
Appendix V	27
Explanatory note by the Railway Board on Appendix V	28

APPENDIX I.

CUTTING FROM GAZETTE OF INDIA, DATED 18TH MARCH 1939.

No. E.-39-C. O.-1.—The Government of India have been seriously concerned at the frequency of incidents on the East Indian Railway during the past year which, on investigation by the Senior Government Inspector of Railways, point to deliberate attempts at train wrecking by the removal of essential parts of the permanent-way. In three instances, namely :—

(1) on the 7th June 1938 between Muthroopore and Sankarpur ;

(2) on the 16th October near Bhadaura ;

(3) on the 12th January 1939 between Chichaki and Hazaribagh Road ;
derailments have occurred which were attended by loss of life. Two subsequent cases occurred, namely :—

(1) near Jamoore on 23rd January 1939 ;

(2) between Kylaht and Chunar on 15th February 1939 ;

when serious disaster was only prevented by timely discovery of the damage to the track. Government also recognize how profound must be the anxiety and apprehension which this series of incidents has created in the public mind and their gravity from the point of view of the Railway Administration. They have, therefore, decided to set up a tribunal which will inquire into the causes of, and circumstances leading up to, these incidents and which after examination of all relevant evidence will report thereon. The Tribunal will consist of :—

(a) Mr. Justice Broomfield, Judge, High Court, Bombay—(President),

(b) Dewan Bahadur M. V. Vellodi, Collector, South Kanara, Madras—(Member),

(c) Khan Bahadur Shaikh Din Muhammad, Sessions Judge, Punjab—(Member),

to assist the Tribunal in appreciating the technical considerations relevant to the inquiry, it will have as Assessors—

(a) Mr. R. Lean, Chief Mechanical Engineer, M. & S. M. Railway.

(b) Mr. A. M. Sims, Deputy General Manager, N. W. Railway.

The meetings of the Tribunal will be held in Calcutta and will commence on March 20th, 1939. Any person desiring to tender evidence or to make representations to the Tribunal should, in the first place, address the President, East Indian Railway Accidents Tribunal, Calcutta, c/o General Manager, East Indian Railway, Calcutta.

APPENDIX II.

APPRECIATION OF THE CAUSES OF THE THREE ACCIDENTS WHICH OCCURRED ON 7TH JUNE, 1938,
16TH OCTOBER, 1938, AND 12TH JANUARY, 1939.*Deraiment of 7th June, 1938.*

Behind the first mark on the sleepers due to the derailment the track appears to have been in perfectly good normal condition. The derailment could, therefore, not have occurred before this point.

The first rail not found in its proper position in the track was only slightly bent and was found lying with one end about 3½ feet towards the outside of the track. For this rail to have got into this position, as a result of a derailment from any other cause than its removal prior to the occurrence, it would have been necessary for the fish bolts to have been sheared which would have led to the fish bolt holes being damaged, the rail screws being bent and probably partly torn out from their holes in the sleepers. The rail and fastenings would have been damaged in such a way as to show clearly that the damage had been caused by the wheels and other parts of the train passing over them. This is made abundantly clear by the position and condition of the rails, sleepers and fastenings immediately ahead of this rail. In addition to this the four fish plates by which this rail would normally have been joined in the track to the other rails were found undamaged with six undamaged fish bolts and 23 undamaged rail screws.

The impact mark on the end of the piece of the next rail immediately ahead indicates very clearly that it had been struck by one of the engine wheels, probably the leading bogie. The fact that this rail was broken is accounted for by the wheel striking it while running on the wooden sleepers at a level of about 5 inches below the running surface of the rail. The wheel being at such a depth, the rail would have received an extremely heavy blow so that it was distorted and twisted before the wheel could have any chance of mounting on to it. In fact it was actually broken and the end which received the blow was thrown forward clear of the subsequent passage of the derailed train.

The marks on the first sleeper could not have been caused by the leading bogie wheels and probably not by any of the engine wheels, because at a speed of 40 miles per hour the wheels would have travelled a distance of over 8 feet before falling low enough to strike the sleepers. The marks on the first sleeper were probably caused by some of the wheels of the last vehicles derailed shortly before the train came to rest. The reason for mentioning this will become clear when the circumstances of the derailment of 9 Up are considered.

Deraiment of 16th October, 1938.

Behind the first sign of damage to the track, the permanent way was found to be in good normal condition. The derailment cannot, therefore, have occurred before this point.

The first rail not in its normal position in the track was found lying on its side but almost in its correct alignment. This rail could not have got into this position as a result of derailment or from any other cause than its having been placed deliberately as found, prior to the occurrence. The reasons for this are that the cast iron inner jaws of the D. and O. plate sleepers must have been broken if the rail had been displaced as a result of accident. In addition to this the fish plate bolts would have been broken or the nuts stripped from the bolts with the consequence of complete destruction of the threads and also damage to the fish plates. This rail would also have had to move against the flanges of the wheels. The four fish plates, all the jaws and three fish bolts were found undamaged. It is inconceivable that the fastenings could have got into such a position and also been found undamaged as the result of an accident.

On the end of the next rail there were marks such as can be accounted for by the mounting of the wheels as the engine (with the exception of two pairs of wheels) and most of the train rerailed. It may be noted that the passing over the outer jaws of the D. and O. plates by the leading bogie wheel, even if while doing so the jaws were broken, would lift the wheel on this side to an extent which would enable it to mount comparatively easily the 1 3/8 inches of difference in level. The marks on the web of the displaced rail can be accounted for by the flanges of the following wheels after the breakage of the jaws.

Deraiment of 12th January, 1939.

Up to the gap in the track where the derailment apparently began no defects could be found. Derailment could not, therefore, have taken place before this point.

The first rail not found in its correct position was entirely undamaged lying on its side roughly in the middle of the track, its forward end being covered with ballast. To have got into this position as a result of accident, when it is clear from the paragraph above that no previous derailment had taken place, the rail would have had to move against the flanges of the wheels. This would only have happened between the trailing wheel of the leading bogie of a coach and the leading wheel of the trailing bogie of the same coach, in other words at a time when the rail was carrying no direct load and, therefore, with no tendency to lateral displacement. The fish bolts must have been broken and the fish plates forced off the joints, in which case evidence of this would have been unmistakable. The removable inside jaws would also either have been broken or the cotters must have sheared; both or either of these would leave unmistakable evidence.

One undamaged fish plate lying outside the track and four fish bolts with nuts removed and showing no sign of damage were found lying on the ballast. Of even greater significance is the fact that one fish bolt and nut and one D. and O. Cotter were found in the ballast undamaged after removal of the rearmost coach. Practically all the loose jaws and cotters of the first displaced rail were found undamaged close alongside the track. The rail beyond the undamaged displaced rail was found half way down the bank bent and twisted with distinct marks of blows from wheel treads and, in addition, marks apparently caused by blows from wheel flanges.

It is certain that in running over the outer fixed jaws of the D. and O. plate sleepers, the leading bogie wheels of the engine, if falling freely, would have dropped the distance from the surface of the rail to the top of the fixed jaws at a train speed of about 55 M. P. H. in a distance of over 6 feet. They would have struck the top of the jaws at an angle not exceeding 2° with the horizontal. At the same speed the drop of the bogie wheels between the fixed jaws would not have been greater than about $5/16$ inch. It is quite clear, therefore, that no particular difficulty could arise in the leading bogie wheel of the engine re-railing.

The first wheel of the tender bogie separated from the trailing coupled wheels of the locomotive by a distance of 10 feet 9 inches and the fact that the tender was carried on two bogies both free to turn on their centres relatively to the tender and also that the coupling between engine and tender is not rigid, the tender would not necessarily follow the same path as the locomotive.

There is little doubt that the passage of the locomotive must have broken most of the outer jaws of the D. and O. plate sleepers and considerable resistance to the passage of the left side wheels of the tender would then have resulted. These wheels must have travelled over broken jaws and loose ballast and would have considerably less chance of re-railing than had the locomotive. Note in this connection the leading tender wheel derailed in the Bhadaura case, although this was a 6-wheeled tender with rigid wheel base.

It does not appear possible to say which wheels behind those of the locomotive actually struck the rail beyond the gap throwing it from its place in the track.

Note.—General to the above three derailment cases. In none of the three cases is there any indication whatsoever that damage to track was caused by the locomotives or the rolling stock before actual derailment occurred.

The circumstances as set forth in each case show that the displacement of the particular rail which caused the accident could not have been the result of defects in the locomotives or rolling stock.

R. LEAN.

A. M. SIMS.

The 4th April 1939.

The 4th April 1939.

APPENDIX III.

INTERROGATORIES RELATING TO HAZARIBAGH ACCIDENT PUT TO THE SENIOR GOVERNMENT INSPECTOR OF RAILWAYS BY MR. SAHAY ON BEHALF OF THE BIHAR GOVERNMENT AND THE REPLIES OF THE SENIOR GOVERNMENT INSPECTOR THERETO.

In paragraph 31 of the Report submitted by the Senior Government Inspector we find that the derailment was due to the removal of a rail from the track. In support of this theory he has described the exact position in which this rail was found after the derailment by the P. W. I. Relying on this evidence he has discussed the various points leading to the conclusion that the derailment had started from this joint. In this connection, however, the following points are not clear either from this report or from the other record of investigation and their elucidation by Expert's opinion seems necessary:—

(I) Is it possible that no mark will be left at the end of the rail just behind the one which is said to have been removed before the accident?

(I) The removal of a rail can in no way affect the action of a train on the previous rail. To effect damage or injury to that rail force must be applied. No abnormal forces have been applied in this case the train merely runs off the rail and into space. If the rail end is left unsupported in this manner for a sufficiently long period it will eventually attain a permanent deflection downwards. No mark can possibly be left on the rail.

(II) Photograph F shows distorted fish bolt holes. According to the finding of the Senior Government Inspector these holes were without bolts at the time of accident. Is such distortion possible when the holes were without bolts? What shape these holes could possibly have taken or what injury they could have sustained if bolts were there in the holes?

(II) Had the bolts been in the holes and presumably the fishplates in position there could have been no bending of the rail and consequently no distortion of the holes. The distortion could only be possible when there were neither fishplates nor bolts.

(III) On going through paragraphs 37 and 38 of the printed report of the S. G. I. we find that in his opinion the engine wheels on the left side travelled almost in air rattling on the outer jaws without being out of alignment and having mounted the 2nd rail went further without derailment and gave impact to the rear vehicles. This shows that the wheels of the engine did not touch the ballast between the gap caused by the removal of the first rail. Contrary to this we find in the case diary of S. I. Osmond dated 13th January 1939 that the tyres of the left wheels of the engine had marks of crushed ballast. A question arises at what other spot these tyres crushed the ballast when they did not come in contact with the ballast in the gap of the first rail.

(III) Ballast is packed on the outside of the rail to the level of the top of the outer jaws, i.e. just below the rail head. The report states that the wheels rattle along the outer jaws *until they are pulverised*. The impact and passage of the bogie wheels alone would be sufficient to break every jaw. They would be kept straight in doing so and so keep the engine and its driving wheels also straight when traversing the gap. The driving wheels and possibly the rear bogie wheel by no means had unbroken jaws to travel over they had a mixture of jaws and ballast. Nowhere has it been stated in the report that the tyres of the driving wheels did not come in contact with ballast in the gap of the first rail.

(IV) From paragraph 38 of the report of the S. G. I. we find that the impact of the wheels of the engine would be communicated to the first joint, viz. tender coupling and it is unlikely that the tender or coaches following would run as straight as the engine did and in fact they did not. When this impact was communicated to the vehicles following the engine, the bogies must be on the rails behind the first rail. A question arises whether those rails would remain in tact or would be distorted.

(IV) An awkward matter to explain. The paragraph in the report merely shows why the tender was not likely to run as straight as the engine not being of one piece with it and being united by a central coupling only. The tender having run askew the coaches following would also run askew. In answer to the question in the last sentence it is only possible to refer to Newton's Law of Motion. 2nd Law:—Change of motion is proportional to, and in direction of, the impressed force. The whole momentum of the train is in a forward straight line. When a head-on obstruction is met with there can be no lateral forces transmitted along the train. Distortion of track by the trailing vehicles of a train stopping in emergency or collision can never distort the track by side action nor have they ever done so.

N.B.—It is very doubtful in this case whether the passengers felt much impact. They probably only felt the violent motion of each coach as it derailed.

(V) In case diary No. 1, dated 13th January 1939 of S. I. Osmond we find that one fish plate with marks of injury in the holes were found near the 2nd joint. It had also marks of crushed ballast. This is suggestive of the fact that this fish plate was of the 2nd joint. Does not the injury in the holes indicate that it was received during the course of derailment when it was attached to the joint.

(V) The records and sketch as signed by the police at site shew nothing of any fishplates having been found at the 2nd joint. If found later it was not reported. Whatever fishplate it is it could not possibly have been forcibly burst off from the junction of the first rail and the 2nd rail.

N.B.—Mr. Sahay afterwards informed the Tribunal that the holes in this fishplate were not in fact damaged and the point was dropped.

(VI) In the same diary as mentioned above we find that one nut and one bolt were found at 6'8" from the 2nd joint without any injury. How the presence of this bolt and the nut in the locality of the 2nd joint can be explained. Is this not suggestive of the presumption that they were left behind through oversight on the previous day when repacking was going on there?

(VI) No, it is extremely unlikely that this bolt and nut were left out by oversight by anybody any more than that the same might be the case with the four nuts and bolts from the other end. As a matter of fact when packing is done the joints are not opened out. This is only done once a year for the greasing and oiling of the plates.

(VII) What was the exact condition of the ballast in the gap of the first rail?

(VII) Good, but ploughed through where the wheels of derailed vehicles had travelled.

(VIII) What was the extent of injury on the outer jaws of the first rail ?

(VIII) The outer jaws of the first rail left hand side were all broken. The first jaw which received only a glancing blow on the top was broken through at the base and remained in position, the next two were more badly broken and the rest were smashed up.

(IX) Did the inner and outer jaws of the right rail parallel to the rail alleged to have been removed receive injuries ?

(IX) Almost all of the inner jaws of the outer rail were smashed off after the first two or three. The outer jaws were some of them bruised.

(X) What was the condition of the tie bars in the gap ?

(X) The tie bars in the gap were all bent and broken except the first two.

(XI) 6 or 8 jaws were found arranged in a line on the embankment opposite the first rail. Apart from the question as to who recovered the jaws and when, what was the point in arranging them in a line ?

(XI) About 14 jaws were actually found altogether, if six or eight were in a line the rest were not, there could be no point in arranging them in a line. They were probably merely placed casually at the toe of the ballast thus forming a fairly straight line.

(XII) The length of rail was 36 ft. The space between the wheels of the two trollies of the bogies was 38 ft. The rear wheel was about a foot away from the first joint on the rail behind it. The front wheels would then stand on the 2nd rail. The first rail therefore should be free from pressure. This also suggests the possibility of its removal after the accident. Is there any evidence to rebut it.

(XII) The 2nd rail being cast down the bank and the leading bogie of the last coach being derailed and imbedded in the ballast and out of alignment so of course there could be no pressure on the first rail after the accident was over. It was pulled out with comparative ease. It is impossible that all outer jaws could be smashed up and the end of the 2nd rail have been hammered as it was had the first rail been in position before the accident, it could not possibly have remained clean straight and unmarked as it was but must also have been bent and battered.

(XIII) The screening and repacking of the portion of the track was done on the two successive days previous to the night of occurrence. No test of this repacking was made. The mate of this section has a previous record of punishment for slack packing. There is embankment and clay is soft. What is the evidence to prove with certainty that there was no low joint at the site of accident ?

(XIII) If recently repacked it was certainly in better condition than before being attended to. Presumably the 2nd joint is the one in question. Low joints do not derail trains. The bank is neither of clay nor is it soft. The track was carefully checked for a full mile and no defective joints or bad condition was found.

(XIV) It has been established in judicial enquiry of Bihta case that low joint is possible even on well maintained track. It has also been proved that X class Engines are severe to the track and readily discover the weak point. It is also proved that due to lurching and the lateral force of the engines having heavy axle load, the line can be slewed. 4 XE Class Engines having 21 tons axle load passed over this line. We don't know the history and the natural tendencies of these engines. 3 H. P. S. class engines also passed over this line during the night. The last one of ill-fated train was 1163 H. P. S. This engine was twice booked within a period of 6 months for its hunting and swaying tendencies which was revealed during the course of Bihta Enquiry. Since then the history of the engine is not known to us. Was any enquiry made by the S. G. I. on this line and was this point considered in coming to the finding to the cause of accident.

(XIV) It has not been proved that X Class engines are severe on track and readily discover weak points. This is a feature of XB class and to a lesser extent XC class. XE are an entirely different class of engine being much heavier, more powerful and slow goods engines. There has never been any suggestion that one of these goods engines has ever affected the track.

In regard to 1163 EPS all engines hunt and sway at times. Very occasionally and rarely there is distortion of track.

In reply to the query in last sentence—No, this line was not within the realms of common sense there being no sign of distortion of track.

(XV) From paragraphs 37 and 38 of the S. G. I.'s report it appears that the wheels of the engine mounted on the 2nd rail after giving terrific blow at its head. The other vehicles following having been derailed passed along the left side of this rail. This rail was found thrown on the left side at a distance of about 30 ft. from its original place, a derailed bogie intervening. A question arises how it was physically possible for this rail to have been thrown to such a distance on the left side under the circumstances. If it is suggested that the point of derailment started at the 2nd joint due to low packing and previous deformation and this rail was thrown off by the very first stroke of the wheel of the engine and the engine passed the gap in the manner described in paragraph 37 of the report of S. G. I. What are the evidence to rebut this suggestion ?

(XV) There is nothing wonderful in a rail being cast down the bank or carried such a small distance as 30' in such an accident once its fastenings had been destroyed.

In regard to the suggestion there are too many obvious difficulties.

(1) To receive the first stroke the end of the rail must be bare and unprotected.

(2) All the sleeper fastenings must be already opened out before it received the blow if the rail is to fly off into space when touched by the engine bogie wheels.

(3) The appearance of the rail rebuts the whole suggestion. It was hit and scrapped along by wheels many more times than once before it was dislodged and cast aside *vide* photo.

APPENDIX IV.

NOTE ON THE METHOD OF DISCONNECTING THE PERMANENT WAY IN THESE CASES AND TECHNICAL KNOWLEDGE REQUIRED.

1. Any attempt at train-wrecking which is made by tampering with the track must mean that the persons involved in such mischief have a certain amount of knowledge connected with mechanical fitting involving the use of simple engineering tools. In the three cases of derailment resulting in loss of life, in order to open out the track in the condition as ascertained for each case, some knowledge of the following points would be required.

2. In order to open up the fish bolts, it is necessary to use a long and heavy spanner of about the correct size. The length would have to be about two feet in order to obtain the necessary leverage. Owing to the tight fitting of the nuts on the threads required by the usual specification, it frequently happens that the bolt tends to turn when attempts are made to loosen the nut. The head of the bolt must then be held from turning, if there is no projection on the fish plate, by another spanner or by a wedge. This means the possession of elementary mechanical knowledge.

3. When the four fish bolts of the ordinary joint are taken out, the fish plates cannot generally be removed without being levered off by a bar placed behind them bearing on the rail or unless they are knocked off by a heavy hammer.

4. After the fish bolts and plates have been taken off, the rail cannot be released until the sleeper fittings are opened out and removed. In the case of the derailment on 7th June, 1938, the flat footed rail was held, before the tampering with the track, to the wooden sleepers by rail screws. To any person unacquainted with permanent way, or not possessing a knowledge of mechanical fitting, it might not appear, from the heads of these rail screws, that these fastenings were screwed into the wooden sleepers, but there is no evidence of these rail screws being forced or prised out from the sleepers and it would appear that the rail screw holes were intact with their threads in the wood in those sleepers which were not broken by the derailment. In order to extract these rail screws quickly and silently a proper box spanner is required or a heavy adjustable spanner of good quality. If these screws were thought to be plain spikes, it would be expected that evidence would be found of attempts to force them out with claw bars or in some other way, but there were no such indications. Such a method would also create a certain amount of noise. It is not necessary to withdraw the screws on both sides of the foot in order to release the rail; it would be sufficient for this to be done on one side only, but the fact that the screws were removed on both sides would indicate the possession of mechanical knowledge but some lack of technical familiarity with the details of permanent way.

5. The weight of a 36 feet rail, at 90 lbs. per yard, is approximately half a ton. It would require three or four men to lever it aside when freed from the track. In order to lift such a rail manually it would be necessary to have about fifteen or sixteen men present. It is to be noted that in the accident on 7th June, 1938, the rail was moved originally towards the outside of the track on the wooden sleepers, but in the cases which occurred on 16th October, 1938, and 12th January, 1939, the rails were on the inside of the track because in the latter two cases it would have been necessary to lift the rails over the outer jaws of the D. and O. plate sleepers if they had been moved to the outside. This would indicate that only a few men, say 3 or 4, were involved in each case.

6. In order to release the rail from the D. and O. plates, after removing the fish bolts and plates as described in paragraph 2 above, a knowledge of the position of the cotter ends is required. Frequently these would be covered with ballast which would have to be removed before the cotters could be knocked out. A particular end of each cotter would also have to be selected for each to be driven out. It would also have to be known that the inside jaws of the D. and O. plates are loose and can be removed only after the cotters have been released. The rail can only be freed after the removal of the inner jaws.

7. In all the three cases of derailment the work of tampering with the track was done during the night, either in the darkness or, perhaps, with the aid of feeble lights of some kind. This would indicate a knowledge of the position of the fittings and, in any case, some time would be required to do the work silently in order to remove the rails. In each of these cases it is significant that there was no moon or it was of no practical assistance. Some selection of the nights on which the derailments were effected would appear to have been made with the intention of affording little chance of observation and of avoiding detection. The relation between each night, when the derailments and attempts at derailment were made, and the moon is indicated below:—

- (i) The derailment on 7th June, 1938, took place six days before full moon.
- (ii) The derailment on 16th October, 1938, took place seven days after full moon.
- (iii) The derailment on 12th January, 1939, took place seven days after full moon.
- (iv) The attempt on 23rd January, 1939, took place twelve days before full moon.
- (v) The attempt on 15th February, 1939, took place eleven days after full moon.

8. In nearly every village scattered along the railway lines in India it is probable that there are some few men who have either worked on the permanent way at one time or another or are familiar to some extent with track details. There are found to be one or two men in nearly every permanent way maintenance gang who are constantly changing for one reason or

another. Near the larger towns there are likely to be fitters or blacksmiths who have been employed in workshops of one kind or another, though they may never have been employed by a railway. Men of these categories would be capable of disconnecting the track in one way or another, if they made themselves somewhat familiar with the fittings of the rails and sleepers. The possession of the necessary tools would not be a difficult problem to men with knowledge of this kind.

9. In each of the three cases of derailment the technique was the same in that a rail was removed (on each occasion). The rail was also on the left hand side of the track in each case, so that it would seem to be expected that the train would plunge down that side of the bank and away from the other line of a double line section. The methods adopted in each case, particularly in view of the removal or attempted removal of a rail on each occasion, would indicate that the attempts were made by men of limited intelligence, since there are other and more expeditious ways of upsetting the track which would be known to the permanent way subordinate supervising staff and to the engineers responsible for the maintenance of the track.

The 4th April 1939.

The 4th April 1939.

R. LEAN.

A. M. SIMS.

APPENDIX V.

Table showing the number of accidents classified as "Train Wrecking" and "Attempted Train Wrecking" on certain class I Railways from 1931-32. (Compiled from the Railway Board's Annual Reports.)

Year.	Assam Bengal Railway.		Bengal and North Western Railway.		Bengal Nagpur Railway.		Bombay, Baroda and Central India Railway.		Eastern Bengal Railway.		East Indian Railway.		Great Indian Peninsula Railway.		Madras and Southern Mahratta Railway.		North Western Railway.		South Indian Railway.	
	Train Wrecking.	"At-tempted Train Wrecking."	Train Wrecking.	"At-tempted Train Wrecking."	Train Wrecking.	"At-tempted Train Wrecking."	Train Wrecking.	"At-tempted Train Wrecking."	Train Wrecking.	"At-tempted Train Wrecking."	Train Wrecking.	"At-tempted Train Wrecking."	Train Wrecking.	"At-tempted Train Wrecking."	Train Wrecking.	"At-tempted Train Wrecking."	Train Wrecking.	"At-tempted Train Wrecking."	Train Wrecking.	At-tempted Train Wrecking."
1931-32 .	..	15	..	..	..	9	18	2	2	14	3	9	3	20	1	21	4	11	..	2
1932-33 .	..	16	2	1	..	15	6	7	..	11	1	16	8	8	2	24	4	2	..	..
1933-34 .	..	8	..	1	..	16	4	11	..	12	2	19	11	8	..	17	1	3	..	..
1934-35 .	..	16	..	1	..	8	3	..	..	11	2	19	9	5	..	23	1	3	1	..
1935-36 .	..	12	..	2	..	12	..	4	1	14	2	16	3	2	..	19	2	2	2	1
1936-37 .	..	8	1	6	..	9	..	2	..	6	..	8	13	2	1	16	1	4	..	..
1937-38 .	..	4	..	..	..	12	..	1	..	..	1	9	7	1	5	31	1	5	..	2
7 years' totals.	..	78	3	10	..	81	31	27	3	73	11	96	54	46	9	151	14	30	3	5

7 years' grand total—"Train Wrecking" 128

7 years' grand total—"Attempted Train Wrecking" 597

An examination of the references in the Railway Board's Annual Reports of accidents due to train wrecking since 1927-28 shows that only in the two cases mentioned below is there any reference given to the culprits being apprehended.

- (1) In 1928-29 there were two cases on the South Indian Railway on 21st and 23rd July, 1928, of tampering with the track causing serious accidents. In the second case a permanent-way gang coolie, a shunter and a goods shed porter were convicted. There was a serious strike on the South Indian Railway at this time.
- (2) In 1929-30 on the Bengal and North Western Railway 57-Up was derailed on 1st August, 1929, owing to tampering with the track. In this case three of the permanent-way staff were convicted.

Explanatory note by the Railway Board on Appendix V of the Report.

For statistical purposes, the term "train wrecking" has been defined as "accidents to trains caused by wilful tampering with the permanent-way or by other means with the intention of wrecking trains". The term "accident" includes *all* mishaps to trains from serious disasters to cases involving perhaps only slight damage to engines, rolling stock or track.

2. It should not, therefore, be assumed that the "train wrecking" figures, which are shown as totalling 128 in the 7-year period, all refer to actual disasters. They include many minor accidents which occurred as a result of what was considered to be sabotage.

3. It has come to notice that in practice the term "train wrecking" has not been uniformly interpreted in the past. The actual number of cases in which trains were wrecked or derailed, with or without fatalities, on Class I Railways during this period of seven years were:—

A. B.	Nil
B. & N. W.	Nil
B. N.	Nil
B., B. & C. I.	Nil*
E. B.	3
E. I.	9
G. I. P.	3
M. & S. M.	9
N. W.	2†
R. & K.	1
S. I.	5

*These relate to a 4-year period ending 1937-38.

†N. W. Ry. records for the years 1931-32 to 1933-34 have been destroyed.