

SOMERSAULT

NOVEMBER 2007

Vol 30, No 6

SIGNALLING RECORD SOCIETY OF VICTORIA INC



Box Hill signalbox in 1968 with signalmen Andy Socrates and Bob Sciberras (sitting) on duty. Box Hill had a 55 lever A pattern frame with two gatewheels to work the gates across Station Street. In this view the annunciator for down trains (at this end of the block shelf) is illuminated, so very shortly after this shot was taken the gate wheel at the far end would be wound around and the signals cleared for the train's departure. Levers 1, 2, 6, 19 and 47 are reversed - 1, 6, 19, and 47 are controlled autos, whilst 2 is the down Home which spent most of its life reverse.

When the box opened on 22 January 1911 it contained a 99 lever tappet frame. It was replaced by this frame on 15 June 1930 when the layout was resignalled using three position light signals. This shows the saving in frame length that could be achieved when one signal worked by one lever applied to multiple routes.

The double line block to Blackburn had been abolished in 1958, and the interlocked gates were replaced on 27 October 1968 by manually controlled boom barriers. At the same time switchout facilities were provided. The goods yard was abolished in 1977, making many of the levers spare. The box was swept away in the grade separation at Station Street where the whole station was lowered and buried underneath a shopping centre. The box was abolished on 1 March 1981 and replaced by a temporary panel in a former waiting room.

Photo by David Langley.

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Published by the Signalling Record Society Victoria Inc (A0024029F)

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MINUTES OF MEETING HELD FRIDAY 21 SEPTEMBER 2007,

AT THE SURREY HILLS NEIGHBOURHOOD CENTRE, 1 BEDFORD AVENUE, SURREY HILLS

Members met at the Surrey Hills Neighbourhood Centre, however were unable to enter the premises. The meeting was transferred to the nearby residence of SRSV member Roderick B. Smith.

Present: - N. Bamford, J. Black, W. Brook, B. Cleak, G. Cleak, G. Cumming, G. Dunn, V. Findlay, C. Gordon, J. Gordon, W. Johnston, K. Lambert, S. Malpass, T. Murray, T. Penn, A. Ponton, B. Sherry, R. Smith, S. Turnbull & R. Williams.

Apologies: - D. Langley, G. O'Flynn, P. Silva, A. Wheatland & R. Whitehead.

In the absence of the President, the Vice - President, Mr. Bill Johnston, took the chair & opened the meeting @ 20:25 hours.

Minutes of the July 2007 Meeting: - Accepted as read. V. Findlay / G. Cleak. Carried.

Business Arising: - It was noted that the boom barriers at Warncourt are now in service.

It was suggested that enhanced yellow warning lights at level crossings are now referred to as advanced yellow warning lights.

A question was asked whether there had been any progress at Trawalla but the answer was not known.

Correspondence: - The renewal for the public liability insurance was sent to Civic Mutual Plus.

The rent for the rooms at Seymour was sent to Victrack.

The invoice for the UK "Signalling Record" for 2006 was received from the SRSUK.

Payment for the UK "Signalling Record" for 2006 was sent to the SRSUK.

A letter from the Publications Group of the ARHS Victorian Division outlined their plans for a future reprint of "Clear Normal Speed" by John F. Sinnatt.

A letter from V/Line Regional Network and Access refused permission to inspect Wodonga "A" Signal Box and Wodonga Coal Sidings Signal Box on Monday 24th September 2007.

G. Cumming / V. Findlay. Carried.

The letter from the ARHS was discussed briefly. The SRSV will offer assistance where possible.

Reports: - Tours. Glenn Cumming advised that due to the late advice from V/Line Regional Network and Access, it was not possible to arrange an alternative tour.

Discussion followed on the future of SRSV tours and what might need to be done to ensure tours in the future.

Bill Johnston provided a brief report on progress on the work on the Market Street signal bridge. Details of the next working bee were provided.

General Business: - The introduction of electric services to Craigieburn is still planned for Sunday 30th September 2007.

The official opening of Roxburgh Park Railway Station took place earlier today.

Keith Lambert provided details on alterations to the Flinders Street viaducts. It has been proposed that Automatic Signals on the North and South viaducts will be converted to Home Signals with Banner Indicators to be provided. This work is due to nearby building works.

It has been suggested that the new signalling at Diamond Creek will be commissioned on the weekend of 15th and 16th December 2007.

Benalla is now an unattended Train Order station. The signals at Benalla are controlled remotely from Centrol.

A report was received of a recent collision between an Up electric train and the hand gates at New Street, Brighton.

Syllabus Item: - The Vice - President introduced member Adrian Ponton to present the Syllabus Item.

Adrian presented a digital slide show showing views of his recent overseas journey through China, Mongolia and across Russia on the Trans Siberian Railway.

Members appreciated the opportunity to view interesting rail scenes from Asia and Europe accompanied by Adrian's commentary.

At the completion of the Syllabus Item, the Vice - President thanked Adrian for the entertainment & this was followed by acclamation from those present.

Note: To suit the altered meeting arrangements and the Syllabus Item Presenter, the Syllabus Item has held at the start of the meeting.

Meeting closed at 22:01 hours.

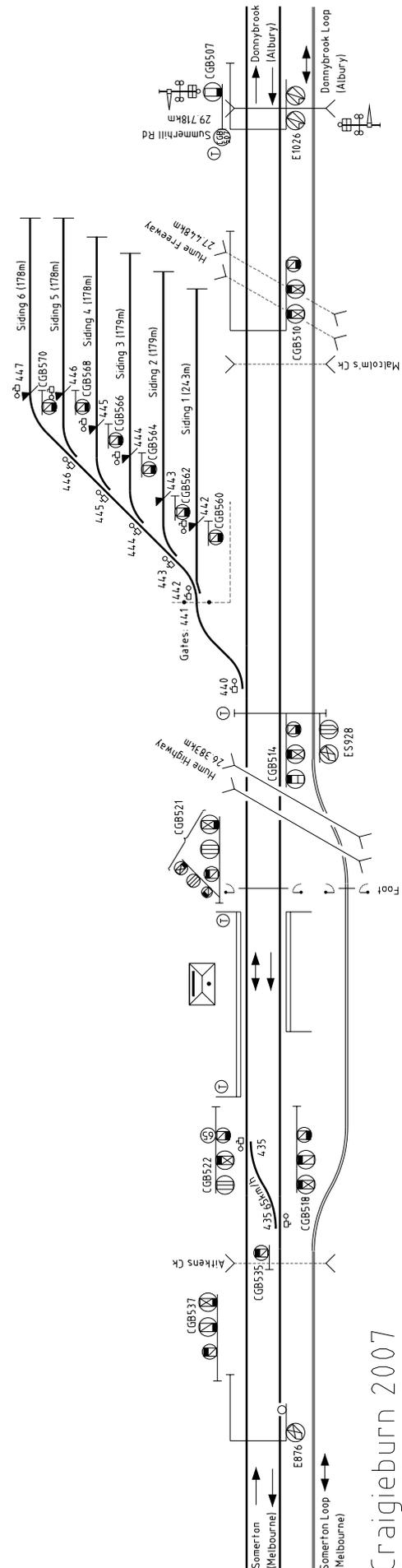
The next meeting will be on Friday 16 November, 2007 at the Surrey Hills Neighbourhood Centre, Bedford Avenue, Surrey Hill, commencing at 20:00 hours (8.00pm).

SIGNALLING ALTERATIONS

The following alterations were published in WN 34/07 to WN 40/07 and ETRB A circulars. The alterations have been edited to conserve space. Dates in parenthesis are the dates of publication, which may not be the date of the alteration.

- 26.08.2007 **Burnley** (SW 204/07, WN 34)
On Sunday, 26.8., a train stop was provided at Dwarf 340. A UPS was provided in the relay room for the SSI/PMUX system.
- (28.08.2007) **Warnambool - Dennington** (TON 259/07, WN 34)
The line has been baulked at 270.700 km, 100 metres on the Down side of Rooneys Rd, due to there being no traffic beyond the Westvic Siding.
- (28.08.2007) **Watchem** (TON 268/07, WN 34)
Watchem Loop must be attended by a competent employee when trains are required to cross due to irregular operation of the boom barriers at Corack Rd.
- (28.08.2007) **Seymour** (TON 258/07, WN 34)
The track between Dwarf 50 and the points from the loco depot to the main line leading to the Seymour Heritage Railway Centre headshunt has been booked out of use.
- (28.08.2007) **Benalla** (TON 266/07, WN 34)
The following tracks were booked out of use due to sleeper condition: the Down end of No 4 Road, including all compound turnouts; Nos 4, 7, and 8 Roads, and K Siding.
- (28.08.2007) **Wodonga** (TON 265/07, WN 34)
The following sidings were booked out of use due to sleeper condition: Siding 8 (points clipped for No 3 Rd), Siding 12 (points clipped for Nos 11 & 12 roads) and Siding 16.
- (28.08.2007) **Shepparton - Dookie** (TON 267/07, WN 34)
The Shepparton - Dookie line was booked out of use due to infrequent use beyond 186.700 km.
- 02.09.2007 **Craigieburn** (SW 209/07, WN 35)
On Saturday, 2.9., Dwarf CGB560 and the Hayes Derail and Crowder 440D in No 1 Siding were moved 140 metres in the Down direction. Points 442U (to give access to the future Nos 2 - 6 Sidings) was provided but secured normal. The stabling siding gates were chained in the open position.
- 07.09.2007 **Werribee - Corio** (SW 141/07, WN 36)
On Friday, 7.9., the control of the block lights for the single line sections Werribee - Little River - Lara - Corio on both the East and West lines was altered so the lights will not show clear unless the entire single line section is clear.
- 09.09.2007 **Newmarket** (SW 212/07, WN 36)
On Sunday, 9.9., Up Home 34 was relocated from the overhead structure to a ground mast located 1.2 metres on the Down side of Structure 198. The A arm is located 5.4 metres from rail level. Amend Diagram 53/07 (Kensington - Essendon).
- 10.09.2007 **Brighton Beach** (SW 217/07, WN 36)
On Monday, 10.9., the New St gates were damaged and the crossing closed to road traffic. The Gate-keeper will continue to operate the pedestrian wickets and control the Up and Down Automatic signals accordingly.
- (11.09.2007) **North Melbourne** (SW 216/07, WN 36)
The route indicator on Down Home NME567 is a Westinghouse single string LED Theatre Route Indicator displaying E for the East Suburban line, U for the Upfield line, and W ('Works') towards the Arden St Sidings. Amend Diagram 21/03.
- (11.09.2007) **Somerton** (TON 278/07, WN 36)
Nos 3 & 4 Tracks have been restored to use following a derailment on 20.08.2007.
- 16.09.2007 **North Melbourne** (SW 219/07, WN 37)
On Sunday, 16.9., the point machine on Points 428U was replaced.

- 23.09.2007 **Deer Park West** (SW 147/07, WN 37)
 On Sunday, 23.9., banner indicators were provided at 20.200 km for Down Homes 2/6 and 2/18. The indicator for Down Home 2/18 is located on the right hand side of the track. Note that the banner indicators are controlled by the track circuits between the indicator and the home and will show a stop indication when the track between the banner indicator and the home is occupied. The VDUs at Ballarat, Sunshine, and Centrol will be updated to show this change. Diagram 126/07 (Ardeer - Rockbank) replaced 24/06.
- (18.09.2007) **Newport - Sunshine** (SW 142/07, WN 37)
 Diagram 112/07 replaced 14/01 as in service.
- (18.09.2007) **North Shore - Geelong** (TON 296/07, WN 37)
 Train 9210 is authorised to operate during passenger traffic between North Shore and Geelong under the provisions of SW 124/07.
- (18.09.2007) **Gheringhap - Inverleigh** (SW 144/07, WN 37)
 Diagram 66/07 replaced 04/03 as in service.
- 23.09.2007 **Flinders St** (SW 225/07, WN 38)
 On Sunday, 23.9., Down Home 586 (east end No 6 Platform) and Down Home 736 (east end No 7 Platform) were converted to R4 tri-colour LEDs.
- (25.09.2007) **Banner Indicators** (SWP 8/07, WN 38)
 A new Rule 5A is provided in Section 34 of the Book of Rules and Operating Procedures covering the use of Banner Indicators between Flinders St and Spencer St. Banner Indicators are provided to provide Drivers with advanced warning of the indication shown on the next signal. Banner Indicators are not fixed signals and are not to be considered the signal in advance when passing defective signals in accordance with Section 3, Book of Rules.
 Banner Indicators are provided with one or more indicators to repeat the signal in advance. A red aspect in the signal in advance is repeated by a white horizontal bar, a yellow aspect by a white bar at 45 degrees, and a green aspect by a white vertical bar. A reflectorised number plate is provided between the indicators to show the number of the signal being repeated.
 The Banner Indicators are ground mounted Style L Mk2-300 double case units, 400mm wide and 1080mm high (above rail level).
- (25.09.2007) **Siemens Trains** (SW 226/07, WN 38)
 The speed restrictions in SW 192/07 applying to Siemens trains are cancelled. The operation of level crossings in express mode (SW 31/07 and 118/07) will continue in force.
- 26.09.2007 **Broadmeadows** (SW 223/07, WN 39)
 On Wednesday, 26.9., Dwarf BMS522 was converted to a blue LED.
- 26.09.2007 **Craigieburn** (SW 218/07, WN 39)
 On Wednesday, 26.9., five additional stabling sidings were provided. Dwarfs CGB562, CGB564, CGB566, CGB568, and CGB570 were commissioned. Points 442, 443, 444, 445, 446 and Derails 443, 444, 445, 446, and 447 were commissioned. The existing Derail 440 was renumbered 442. The stabling siding gates will be commissioned at a later date.
 Diagram 122/07 (Craigieburn - Wallan) replaced 82/07.
- 26.09.2007 **Sandringham** (SW 222/07, WN 39)
 On Wednesday, 26.8., pedestrian gates were provided at Abbott St (19.004 km). Amend Diagram 49/07 (Prahan - Sandringham).



Craigieburn 2007

- 27.09.2007 **Seymour** (SW 151/07, WN 39)
From 27.9., the Station Access Rd (98.652 km) will be closed to all but construction vehicles. Gates will be provided across the road on both sides of the crossing and the keys will be held by the Track Force Co-ordinator. The boom barriers will remain operational.
- 30.09.2007 **Donnybrook** (SW 235/07, WN 39)
Commencing Sunday, 30.9., the signalbox will only be switched in when required for absolute occupations, special traffic etc.
- 30.09.2007 **Wallan** (TON 306/07, WN 39)
Commencing Sunday, 30.9., the signalbox hours will be:
Monday - Friday 0530 hours until 2120 hours (clearance of 9319 Goods)
- 30.09.2007 **Broadford** (TON 306/07, WN 39)
Commencing Sunday, 30.9., the signalbox hours will be:
Monday - Friday 0505 hours until 1110 hours (clearance of 8309 Pass) & 1450 hours until 2010 hours (clearance of 8335 Pass)
- (02.10.2007) **Warracknabeal** (SW 149/07, WN 39)
A new Procedure 77A is to be added to Section 34 of the Book of Rules and Operating Procedures describing the equipment and operation of Warracknabeal.
Warracknabeal may be either an Attended Crossing Station (when attended) or an Intermediate Train Order location (when unattended). When trains are to cross a Signaller must attend 30 minutes prior to the arrival of the first train, or prior to the issuing of the opposing Train Order.
The Up end main line points are plunger locked. All other main line points at Warracknabeal are secured by an Annett lock. The key is kept in a lock on the quadrant working Down Home A. The lock on the quadrant is electrically detected, and removal of the key not only secures Down Home A at Stop, but will also place (light) Up Home H at Stop. After the key is restored to the lock on the quadrant, Up Home H can be cleared using the keyswitch adjacent to the quadrant.
Warrackside Siding is 150 metres on the Down side of Up Home H. The Up end points are secured by an E pattern Annett lock. The key is kept in a duplex lock operated by an ST21 Master Key. Removal of the Annett key will secured Up Home H at Stop. If a train is required to pass Up Home H at Stop and a Signaller is not in attendance at Warracknabeal, the Driver must be in possession of a Train Order for the Murtoa - Hopetoun section. The Driver must then ensure that the competent employee assisting with the shunting is in possession of the E pattern Annett key (or it is being used to unlock the points). The Driver may then pass Up Home H at Stop. If a signaller is in attendance, permission must be obtained from the Signaller to pass Up Home H at Stop. The Down end points at Warrackside are secured by an ST21 Master Key lock.
The flashing lights at Kellsell St (349.130 km) at the Down end of Warracknabeal station will normally operated automatically on the approach of trains. When Homes A or H are at Stop, and either the B or E pattern Annett keys have been withdrawn from their locks, the approach operation of Kellsell St will be suppressed and the flashing lights must be manually operated by the keyswitch. Notice boards are erected on each side of the level crossing.
- (02.10.2007) **Somerton** (SW 148/07, WN 39)
Procedure 99 in Section 34 of the Book of Rules and Operating Procedures has been revised to allow for two trains to enter Somerton yard at one time, but only one train may shunt at any one time. Stop Board 9 has been provided and applies to standard gauge movements from No 3A Road towards the Austrak Siding. Stop Board 7 has been provided and applies to movements from Tubemakers Siding.
Diagram 106/07 replaced 41/07.
- (02.10.2007) **Shepparton** (SW 155/07, TON 312/07, WN 39)
Procedure 110 in Section 34 of the Book of Rules and Operating Procedures (Driver in Charge operation at Shepparton) was amended to remove the reference to the trains to which it would apply.
Procedure 110 will apply to Train 8333 on Saturday, and Trains 8309 and 8333 on Sunday
- 04.10.2007 **Ouyen - South Australian Border** (SW 313/07, WN 40)
From 4.10., this line will be booked out of service due to track condition. Baulks are provided opposite Post 2 at Ouyen.
- 06.10.2007 **Brighton Beach - New Street** (SW 340/07, WN 40)
On Saturday, 6.10., electric contacts were provided on the levers operating the wickets. Automatics B497 and B498 will be held at Stop unless the wicket levers are reverse. In addition B497 and B498 were converted from non-stick to stick operation.
- 07.10.2007 **Flinders St** (SW 237/07, WN 40)
On Sunday, 7.10., Down Home 160 was converted to tri-colour LED.

THE INTRODUCTION OF AUTOMATIC STAFF EXCHANGERS IN VICTORIA

While very safe, token systems were also inflexible. One of the many difficulties of token working was the exchanging of tokens at crossing stations. Safe hand exchanges were restricted to relatively low speeds and this required trains to slow down at each crossing station. To give some idea of the inefficiencies, the line speed on the Victorian NE line in the mid twenties was 60 mph. At each of the 17 staff stations from Mangalore and Wodonga trains had to reduce speed to 20 mph. The almost inevitable tendency to shave on this speed limit led to staff injuries in exchanging staffs. There was consequently a considerable incentive to introduce mechanical staff exchangers. The automatic staff exchanger used in Victoria from 1926 to 1994 was developed in NSW. As it is one of the few signalling inventions developed in one Australia state and used in other Australian states (Victoria and South Australia), its introduction into Victoria may be of interest.

The first tablet exchanger was developed by James Manson the Locomotive Superintendent on the Great North of Scotland Railway in May 1889. Manson did not patent his invention as he intended it to be available to others to use in the hope that it would reduce injuries to staff. In addition to the Great Northern, Manson's exchangers were used on the Highland and Caledonian Railways. In the 1890s Purdon developed a method of exchanging large electric staffs at speed, and this was used on the Irish Great Southern & Western Railway and Great Northern Railway. Alfred Whitaker of the Somerset and Dorset Railway patented a variant of Manson's design in 1905, and this was subsequently marketed by the Railway Signal Company. Apart from the S&DR, Whitaker's instruments were used by the Midland and Great Northern Railway. In New Zealand, H.J. Wynne developed his own variant of the Manson/Whitaker exchanger around 1903. The first mechanical exchange of miniature electric staffs occurred around 1900 in the US. The US&S Co developed a miniature electric staff 6" long and weighing 6 1/2 ounces specifically to facilitate high speed exchanges. The exchange was by means of 'staff cranes' which appear to be very similar to the contemporary NSW approach.

In New South Wales, W.M. Quirke, a mechanical engineer, developed a tablet exchanger around 1890. This was patented in the UK in 1891. Quirke's exchangers were installed between Picton and Mittagong in NSW in January 1893. By 1895 they had been installed through to Albury. In 1908 William Clark, then a Steam Shed Inspector at Junee, patented a variation of Quirk's exchanger. Clark's innovation consisted in adopting a helical catcher, known in NSW as the 'ram's horn' and a presenting the staff carrier with the hoop down. The advantage of the helical catcher was the additional friction as the incoming staff swung around the catcher. The hoop was also be less likely to rebound off the catcher spike. Clark patented his innovation (Australian patent 13284/08 and British Patent No 11686/09) and it was adopted as standard practice in NSW around 1916.

It appears that the VR had trialled mechanical exchangers in 1908. Few details are available, but sets of tablet apparatus had been purchased in 1907 from NSW (presumably Quirk's exchanger as Clark had not yet patented his innovation) and Mr Wynne (Signal & Electrical Engineer of NZR) in 1907. These were trialled in 1908 and it was decided that the NSW type was more suitable for Victorian conditions. Nothing was done pending track locking (this was to prevent the signals being cleared for a high speed train by mistake when the main line was occupied by the opposing train).

The Clark mechanical staff exchanger came to Victoria in the mid twenties. The genesis was a suggestion made to the Dandenong district Fuel Conservation committee, probably in late 1922, by Signal Supervisor L.J.A. Richardson. He suggested that a better means of exchanging staffs on express trains should be adopted to avoid having to slow down to hand exchange at 15 to 20 mph.

On 31 January 1923 the Assistant Chief Mechanical Engineer (CME) informed the General Superintendent of Transportation (GST) of the suggestion and noted mechanical exchangers were used elsewhere with success and could result in considerable savings in fuel. They had been considered in Victoria in the past, but "for some reason" they were not adopted and the files had since been destroyed. The Assistant CME asked the GST whether there were any safeworking objections to mechanical exchange, and if not, the Rolling Stock Branch would develop such a system.

The GST asked the Superintendent of Goods Train Services (SGTS) to respond. The file was then lost, and the SGTS had to be reminded about the query and asked for an urgent memo on the general position. The SGTS responded that he could not definitely state the objections to mechanical exchangers, but understood it was generally on account of cost. To get further information, on 10 March 1923, the General Superintendent wrote to his counterpart on the NSW railway (C.A. Hodgson) asking what experience they have had with mechanical staff exchangers "as I understand that such appliances are in use on your railway." Hodgson responded briefly on 29 March. He first noted that exchangers were not used for full sized electric staffs. He continued, "in a few cases where miniature electric staffs were in use, the exchanging is carried out by the use of the ordinary tablet exchangers, the only alteration necessary being that to the pouch to enable the miniature staff to fit in the exchanging apparatus". He also forwarded a copy of the pouch. The SGTS subsequently produced the following memo:

The information which we have obtained from New South Wales indicates that this System of Staff Exchange by Mechanical appliances is not generally adopted there. It would appear that on some Sections, the System of exchanging Tablets was in use and in a few instances these were altered to accommodate miniature Electric Staffs similar to the Staff System in operation on the North East Line, but I gather from his communication received that for some reason not disclosed in the correspondence, the mechanical means of exchange is not generally adopted.

It cannot, at this stage, be determined whether there would be any objection from a Safeworking point of view to the installation of mechanical Staff Exchange appliances. This could only be considered on receiving any suggestion which would be made by the Rolling Stock branch in developing a suitable appliance.

At the very best, it is clear that the SGTS had no knowledge of practices north of the border and was very negatively reading between the lines of Hodgson's reply. The main reason, of course, that miniature staff exchangers were rarely used in NSW at that time was that the main south line was primarily equipped with tablet instruments. It is also worth noting that the SGTS considered that the Transportation Branch should only comment on the question of staff exchangers when the Rolling Stock Branch had made

concrete suggestions. Clearly the Transportation Branch could not make any general comments about the safeworking implications of staff exchangers. The Outdoor Superintendent considerably toned down this negative attitude in his response to the CME on 10 April 1923. He admitted the advantage in speeding up exchange, but noted that the actual advantage would depend on the exchanging speed achieved and the cost. He suggested asking the Chief Engineer Signal & Telegraphs for these details. Finally, the Outdoor Superintendent noted that any change to the current approach would require a thorough investigation. Following this suggestion, the CME wrote to the Chief Engineer, Signals and Telegraphs, F.M. Calcutt, on 13 April.

Calcutt responded on 2 May 1923. In his short memo he showed that he did know what was going on north of the border, and also that he knew the past history in Victoria despite the file having been lost. He noted that the NSW system had been in use between Junee and Albury for many years. He had seen it in operation and it worked very satisfactorily exchanging at 40 mph with few failures. The provision of mechanical staff exchangers had been previously suggested for the NE line, but had not been favoured unless the stations were tracklocked. He noted that this objection would soon cease as all stations between Mangalore and Albury would be tracklocked within the next few months (Violet Town was probably the last to be track locked, in December 1924). He recommended that mechanical exchangers be introduced. The cost of the ground apparatus and carriers would be £1500, and engine equipment would be around £15 per engine. The saving of time and coal should cover the interest on this expenditure.

On 23 May 1923, the CME wrote to E.E. Lucy, his NSW equivalent, asking for his experiences of mechanical exchangers. Lucy replied on 2 June "[our] experience has been very satisfactory since we have had the ram's horn receiver, the loss of the tablet by reflex action having practically ceased." He enclosed print 15.400 showing the engine apparatus fitted to an NN (C36) class locomotive and promised that the Signal Engineer, C.B. Byles, would send drawings of the ground apparatus.

As a result of these memos, the Assistant CME recommended a thorough test of mechanical exchangers on 3 July. It was estimated that there would be a saving of 2 shillings in coal at each station alone due to the elimination of slowing down, in addition to savings due to increased average speed, less wear on brake blocks, and the reduced chance of injury to firemen. He consequently considered it very desirable to introduce mechanical staff exchangers where there was a considerable amount of express passenger or through goods running. He suggested a trial between Mangalore and Wodonga. The estimated rolling stock cost for express engines would be £132.

In response to further questions about costs, on 27 July 1923, Lucy noted that the ground apparatus cost £10, the fittings for engines £15, and cost of attachment to engines 9/-.

The Chairman of Commissioners wrote to Calcutt on 7 August 1923 asking him to look into the provision of mechanical staff exchangers to speed up the train service on the NE line (note that the Commissioner's priority was not coal conservation). On 14 August Calcutt wrote to his counterpart in NSW, C.B. Byles, asking for the cost of the apparatus, including the special pouches, the number of pouches supplied to each station, and up to date drawings. Byles responded on 28 August 1923 with copies of drawings J30 (tablet exchanger ground gear) and J32 (exchanging ring) and quoting the costs of installing the staff exchanger. The ground tablet exchanger cost £12/10/0 including erection. The special pouches cost 17/6 each and four were supplied

to each station. The engine attachment, fitted, cost £15/9/0. Note that Byle's cost for the ground apparatus was nearly 33% greater than Lucy's, and this did not include the cost of the special pouches necessary. Calcutt responded to the Commissioner on 7 September noting that the apparatus was very satisfactory and permitted exchanges at 40 mph. The cost of equipping 16 stations and 10 engines would be £700 (presumably Benalla was not to be equipped). It would eliminate danger to employees in exchanging staffs and also the damage to staffs due to mis-exchanges. The running time of trains would be reduced and savings effected due to elimination of slowing down.

In parallel to this, the CME formally asked the GST on 25 August whether there were any objections to a trial of mechanical exchangers. The GST responded on 4 September stating there were no objections to a trial on the NE line. He suggested equipping one station (Locksley, for some reason) and one locomotive.

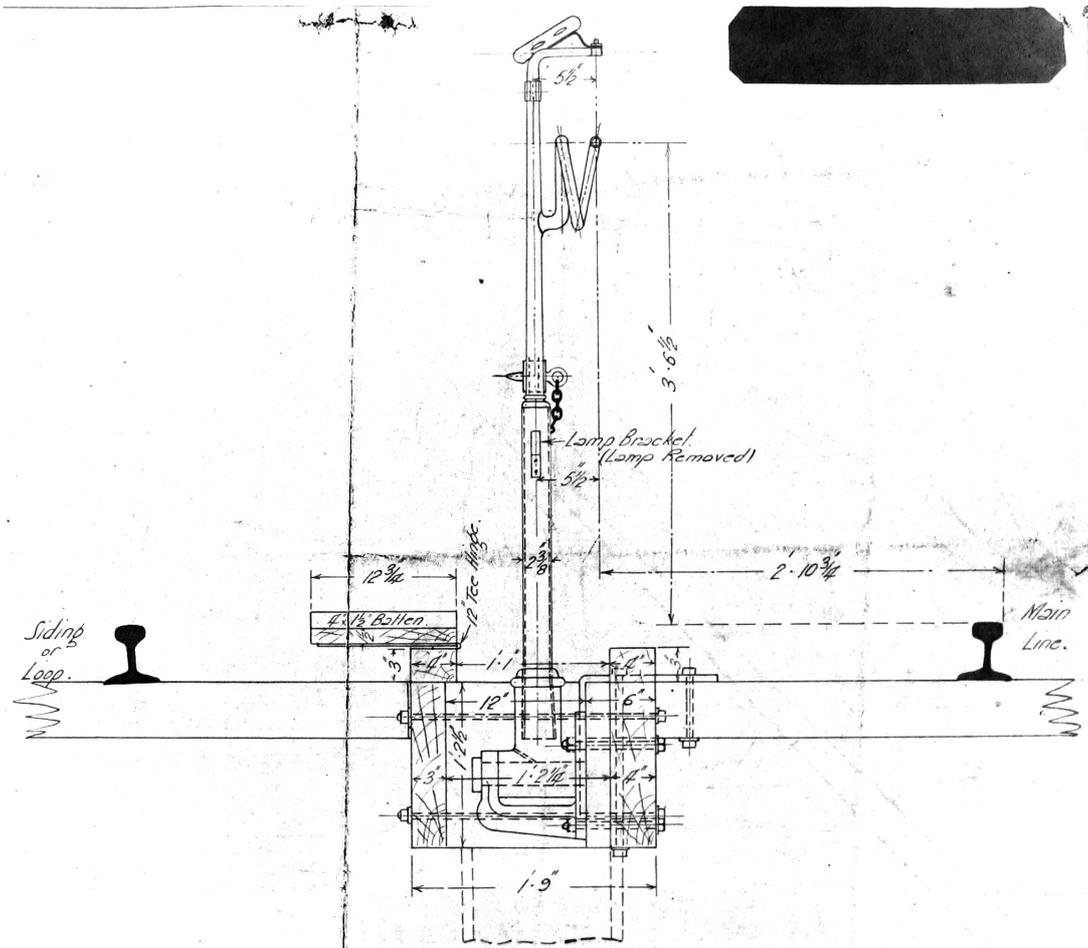
On 3 October 1923 the CME, GST, and CE S&T jointly recommended to the Commissioners that mechanical staff exchangers be provided on the NE line between Mangalore and Wodonga (16 staff stations). Ten engines were to be equipped with the equipment. The capital cost would be £700. Consideration should be given to subsequently extending the system. The Commissions approved the recommendation on 15 October 1923, noting that care must be taken not to increase speeds through any stations that had not been tracklocked. The formal approval of the expenditure from Act 3299 Appropriation 1/5913 was not signed by the Commissioners until 26 March 1924 and by the Minister on 31 March 1924.

The CME instructed his staff on 23 October that the Commissioners had approved the equipping of 10 A2 class engines stationed at Benalla and that work should be pushed on with. The engine apparatus was to be manufactured at Newport to drawings prepared in the Rolling Stock branch drawing office. Patent issues would be reported upon by Mr McMiken. The CE S&T would provide the ground apparatus and slings.

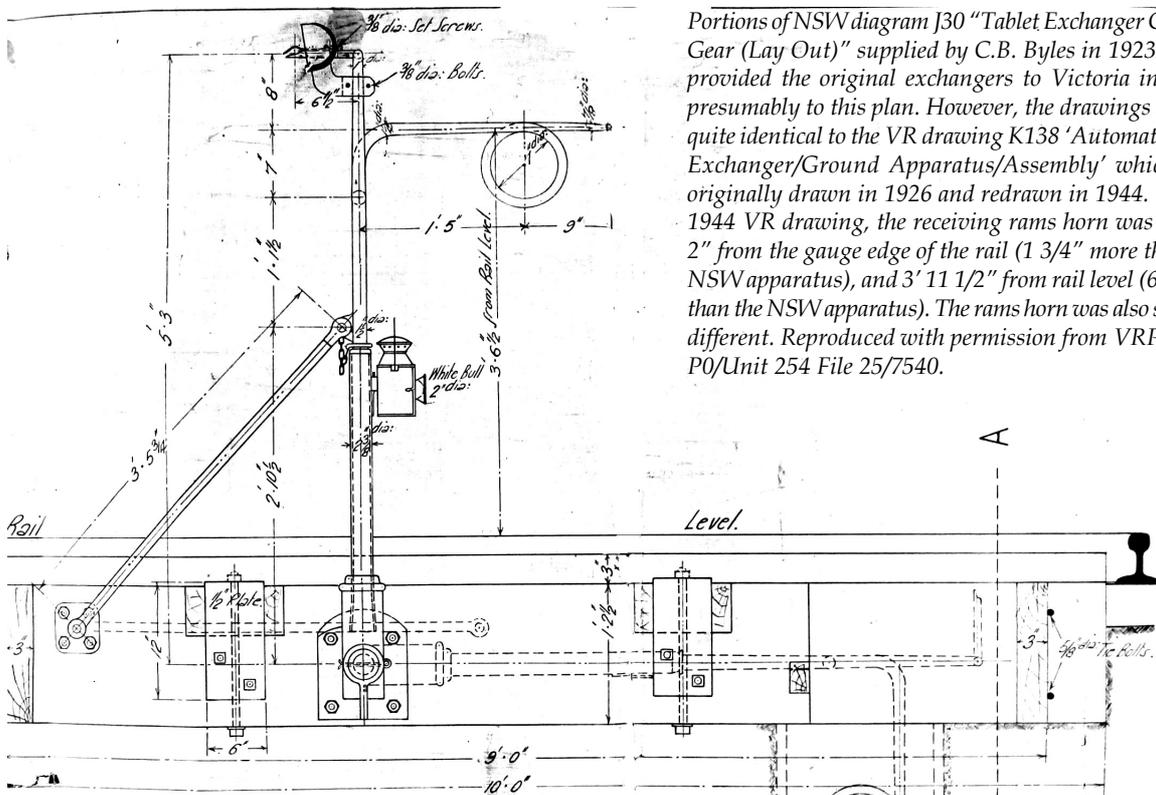
A formal cost estimate was prepared by the S&T branch on 21 January 1924:

		Labour	Materials
Ground apparatus	32	£128/00/00	£320/00/00
Fittings on engine	10	£4/10/00	£150/00/00
Slings	100	£40/00/00	
Total		£132/10/00	£510/00/00
10% provision		£13/05/00	£51/00/00
General expenses (21%)			£31/12/12
Total		£176/07/02	£561/00/00
Grand Total			£737/07/02

The CME wrote to Calcutt on 1 February 1924 asking when the ground work would be completed. Calcutt responded that he was negotiating with the NSW railways for the supply of one set of tablet exchangers which might need slight alterations for the electric staff. The CME then wrote to Lucy on 15 February informing him that the Commissioners had approved the installation of exchangers on the NE line, and that Calcutt would contact him about obtaining a sample set. He then went on to state that he understood a number of ground apparatus had been released after the duplication of the main line to Goulburn Junction and asked whether it would be possible to purchase any of these sets? Lucy responded on 13 March that he had sent one engine tablet exchanging set "under separate cover" with "much pleasure". A station set had already been supplied to Calcutt in January. On 20 March 1924 Calcutt wrote to the CME stating that he had one sample ground apparatus and pouch (note the slight discrepancy between Lucy's version and Calcutt's version). He proposed to set it up for



SECTIONAL ELEVATION AT A.A.



SIDE ELEVATION.
(With Front of Box Removed.)

Portions of NSW diagram J30 "Tablet Exchanger Ground Gear (Lay Out)" supplied by C.B. Byles in 1923. NSW provided the original exchangers to Victoria in 1925, presumably to this plan. However, the drawings are not quite identical to the VR drawing K138 'Automatic Staff Exchanger/Ground Apparatus/Assembly' which was originally drawn in 1926 and redrawn in 1944. On the 1944 VR drawing, the receiving rams horn was 3' 0 1/2" from the gauge edge of the rail (1 3/4" more than the NSW apparatus), and 3' 11 1/2" from rail level (6" more than the NSW apparatus). The rams horn was also slightly different. Reproduced with permission from VRPS 421/P0/Unit 254 File 25/7540.

trial and wanted to know if the clearance and height shown on NSW drawing J30 would be suitable in Victoria.

On 5 August 1924 Rolling Stock Branch engineers T. Doyle and G McMiken noted that the apparatus received from NSW was not suitable for VR engines due to the difference in width of the engine cabs. In consequence A2 drawing 208 showing the staff exchanger had been prepared and they recommended that one engine be fitted at Newport so that a trial could be made on the Laverton line. Calcutt was to be advised about one week before the engine was ready. In passing they noted that the patent on the apparatus had expired. Engine A2 983, then undergoing overhaul at Newport, was fitted with the first exchanger. Trials of the apparatus took place on the Werribee line on 13 November 1924. Unfortunately, the location of the trials is not given in the file, but it was likely to have been either Laverton or Newport South. Satisfactory exchanges were made at 25 mph, 37 mph, and 42 mph. At 48 mph a satisfactory exchange was made, but the pouch ring was slightly distorted. The test engineers consequently recommended the maximum exchanging speed should be 40 mph. Calcutt formally asked the CME on the same day if the ground apparatus was satisfactory. If so, he proposed to obtain them from NSW as they had a surplus stock of them.

On 4 December Doyle & McMiken recommended, as a result of the trial with A2 983, that the apparatus be raised 5" to avoid damage to the staff in the event of the enginemen not operating (raising) the gear promptly when the ground apparatus was close to a platform. They noted that Calcutt had agreed to this alteration.

On 8 December the CME instructed the Workshops Manager at Newport that a second trial should be undertaken as soon as possible so that progress could be made in introducing exchangers. The Workshops Manager Newport replied to the CME on 22 December that the revised prints had been received, and the order for 10 sets of engine apparatus was to hand, but only one set for trial would be proceeded with. On 3 February 1925 the CME asked the Workshops Manager about the position, and stated that he desired that the matter be pushed on. The Workshops Manager replied on 10 February that the revised gear would be fitted to A2 1000, which was due to be outshopped on 28 February. The second trial duly took place on 17 March with satisfactory exchanges at 42 and 45 mph. The test engineers recommended that the exchanger on A2 983 be raised 5" to match A2 1000. They also noted that measurements of the ground apparatus showed that the distance from the rams horn to the ring clip was about 7 1/2" instead of the 8" shown on drawing J30. As this reduced the clearance, the ground apparatus should be altered to conform to the drawing, and further exchangers should be checked.

With the equipment judged a success, the Rolling Stock Branch considered which engines should be fitted with exchangers. The two main factors were a policy to isolate engines fitted with mechanical lubricators at Benalla, and to ensure that the date engines fitted with exchangers became due for their next overhaul was spread over a long period. There were currently seven A2 engines at Benalla, three with mechanical lubricators. These engines, with probable dates for overhaul, were: 992 (July 1925), 996 (March 1926), 998 (March 1926), 999 (May 1926), 1058 (May 1926), 983 (August 1926), and 942 (August 1926). Of these, 942, 998, and 999 were fitted with mechanical lubricators. There were three locomotives fitted with mechanical lubricators not stationed at Benalla: 985, 1000, and 1001. A2 985 had left Newport in December 1924, A2 1000 on 13 March, and A2 1001 was due out on 22 April. A2 1000 was fitted with an exchanger, and A2 1001 would be fitted during overhaul. It

was recommended that A2 992, 996, and 1058 be replaced by A2 985, 1000, and 1001. The remaining locomotives would be fitted with exchangers at Benalla, while No 985 could be fitted at either Benalla or North Melbourne.

On 8 April 1925 the CME instructed that A2 983 was to be altered to conform to A2 1000. As it was considered that only seven engines would be required to cover the four required for the express trains between Seymour and Wodonga Engines A2 942, 985, 998, and 999 were to be fitted (presumably A2 1001 had also been already fitted). The CME instructed that introduction of the exchangers was not to be delayed until all engines were equipped. On 1 December 1925 the CME noted the costs of the engine apparatus as £28 labour and £1 materials - a considerable increase over the estimate.

The S&T Branch were responsible for providing the ground apparatus, and they obtained the necessary equipment from New South Wales. On 4 March 1925 Byles offered to supply 36 sets of ground apparatus (ironwork only) at £4 per set, and 80 staff exchange pouches at 13/10 each (excluding transportation costs to Melbourne). Calcutt noted on the file on 8 May 1925 that the exchangers would be erected within 2 months of their receipt from NSW. The order authorising the Stores Branch to obtain the equipment was signed the next day. Calcutt wrote to Byles on 26 May stating that the Chairman of Commissioners desired the work to be expedited and asked when the exchangers would be forwarded. Byles responded on 2 June that the first consignment would be shipped on 14 June. The delay was due to the need to alter the exchangers (the nature of this alteration was not recorded). The ground apparatus and the pouches were shipped from NSW on 27 June, and the lamps were shipped around the 3 July. An S&T works order was issued on 20 August 1925 to install staff exchangers at Avenel, Locksley, Longwood, Creighton, Euroa, Balmattum, Violet Town, Baddaginnie, Glenrowan, Wangaratta, Bowser, Springhurst, Chiltern, and Barnawatha. On 7 October 1925 a similar order was issued for the provision of staff exchangers at Mangalore (this was completed on 14 November). Note that staff exchangers were not provided at either Benalla or Wodonga.

On 27 November 1925 the Chairman of the Betterment Board noted that L.J.A. Richardson had asked that credit be given to him for the introduction of staff exchangers. Richardson did not claim the idea was original, but did claim that their introduction came about by a suggestion he submitted to the Central Fuel Conservation Committee. The Chief Time Tables Officer responded on 24 February 1926 that he had no knowledge of any suggestion from the Betterment Board, but "it was suggested from this office more than 2 years ago, and it has been under review from time to time since". Success always has many fathers! On 17 February 1926 the Betterment Board noted that it has been requested to reward the officer who made the suggestion and asked what economies or improvements in operation have been made. The Chief Time Tables Officer noted that the provision of the exchangers had considerably improved the timekeeping of the expresses and enabled a heavier load to be hauled by a single engine owing to the greater speed through stations. In March the Betterment Board recommended that Richardson be paid 3 guineas (£3/3/0) as there is "some justification for his claim". This was approved by the Commissioners on 15 April. Richardson was notified of his reward on 21 April and told that a suitable entry would be made on his history sheet.

Not everyone, however, was getting bouquets from the Commissioners. At the same meeting, Calcutt was asked why the estimate was "so inaccurately calculated" that it was exceeded by £276. Calcutt explained that the original

estimate was based on a NSW figure of £10 for each exchanger erected on ground. While the ironwork was supplied by NSW for £4, it had been necessary to construct the timber frame at the Workshops and this had cost £3/15/0 per exchanger. It was also necessary to alter the exchanger for Victorian conditions. The cost, complete, of each exchanger installed £15 each. The estimate was also low by £88 to cover the cost of long sleepers and pits for exchangers. The engine fittings exceeded the estimate by £15. Finally, it was also necessary to charge £29/14/4 to working expenses to alter drains and water pipes at Euroa and Wangaratta.

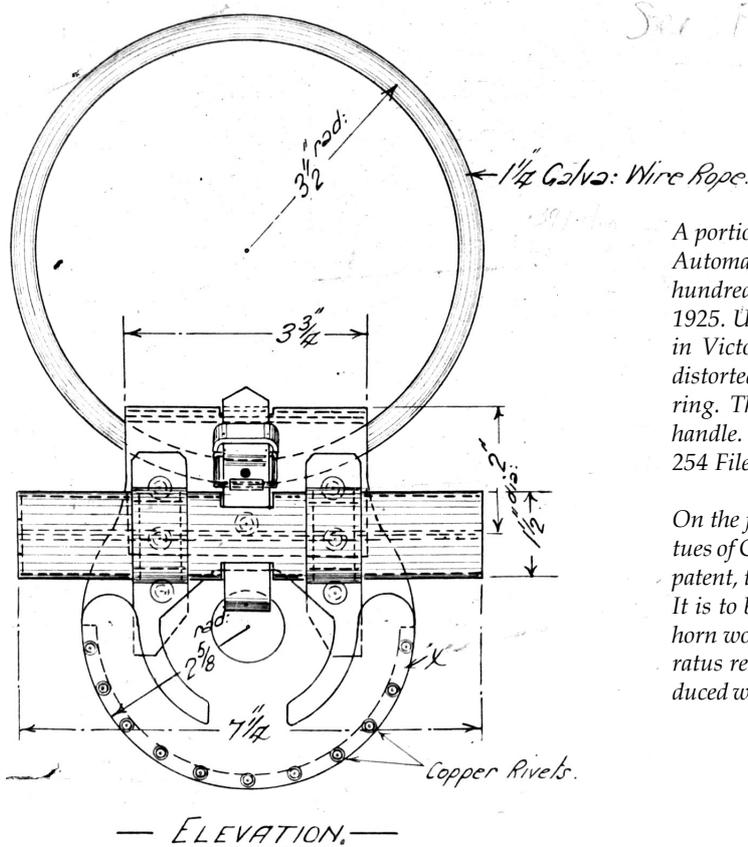
Unfortunately, the file does not indicate when the automatic exchange apparatus was actually brought into use. It appears that the seven locomotives were equipped in mid 1925, and the ground apparatus were installed in late 1925. The register for the AGST's correspondence notes that draft instructions for the use of automatic staff exchangers were sent to the CME on 6 November 1925 and that they were subsequently approved. By 16 December 1925 Calcutt was proposing to equip the western line between Sunshine and Kaniva. By February 1926 sufficient experience with automatic exchangers had been gained to judge that the time-keeping of trains had improved and that heavier trains could be hauled. This suggests an in service date in November 1925. However, no notification of their introduc-

tion has been found. The first formal notification of their use in the Weekly Notice was in WN 32/26 (dated 10 August). This gave the instructions for use, the locations of the exchange apparatus, and the trains for which its use was authorised.

References and Acknowledgements

Most of the information in this article has been taken from VRPS 421/P0 Unit 254 Secretary's Branch File 25/7540. I would like to thank Damian Thomas for bringing the file to my attention. The detail of early mechanical staff exchangers has been taken from

- * The Telegraph and the Absolute Block, Single Line Operation, David Stirling, The History and development of railway signalling in the British Isles, Volume 2, Friends of the National Railway Museum, 2002
- * An Illustrated History of Signalling, Michael A. Vanns, Ian Allen, 1997
- * The Electric Train Staff System, T.H. Patenall, Railway Signaling IV, The Electric Journal, 1907
- * The Automatic Tablet Exchanger, J.A. Dangerfield, The N.Z. Railway Observer, Spring 1982



A portion of the contemporary NSW drawing J32 title "Sling for Automatically Exchanging Miniature Electric Train Staff". One hundred of these pouches were supplied to Victoria by NSW in 1925. Unlike the ground apparatus, these did not have a long life in Victoria. It was quickly found that the automatic exchanges distorted the ring and broke strands in the wire rope forming the ring. The broken wires made the pouch dangerous for staff to handle. Reproduced with permission from VRPS 421/P0/Unit 254 File 25/7540.

On the following pages are copies of a pamphlet extolling the virtues of Clarke's patent tablet exchanger. This includes the original patent, together with photographs of the exchanger in use in NSW. It is to be noted that the original patent envisaged that the rams horn would only be provided on the locomotive, the ground apparatus retained the straight horn of the Quirke apparatus. Reproduced with permission from VRPS 421/P0/Unit 254 File 25/7540.

G. G. TURRI & CO.

OFFICE FOR WORLD'S PATENTS - TRADE MARKS - DESIGNS.

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ESTABLISHED 1887.
TELEPHONE: CENTRAL 4830.

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MEMBER AERONAUTICAL
SOCIETY (LONDON) AND
AERIAL LEAGUE (AUSTRALIA).
A COMMISSIONER
FOR TAKING DECLARATIONS
AND AFFIDAVITS.

**CLARK'S PATENT
TABLET EXCHANGER**
is Patented
in the
undermentioned
Countries, viz:—

GREAT BRITAIN
No. 11686/09

AUSTRALIA
No. 13284.

NEW ZEALAND
No. 25796.

UNITED STATES
No. 930042.

CANADA
No. 121869.

NATAL
No. 173/09.

TRANSVAAL
No. 459/09.

CAPE COLONY
No. 4321.

FRANCE
No. 408311.

BELGIUM
No. 220174.

(and others).

20th September, 1910.

Dear Sir,

We herewith send (for the convenience of your engineers) particulars of the CLARK TABLET EXCHANGER, with photographic illustrations of the Exchanger IN ACTUAL USE on the Government Railways of New South Wales, in connection with the fastest Express Railway Train of this Commonwealth, running between Melbourne and Sydney.

In view of the Government adoption of the TABLET EXCHANGER (a License to use having been purchased) we shall be pleased to learn whether you would try this invention.

To assist you to fully understand it, we supply a Printed Copy of the Patent Specification. The post is not used as an upright fixture, as there shown however, but is hinged. When a train is not expected the post is dropped into a box or recess on the ground.

If we or our Agent abroad may to advantage address one of these pamphlets to some other Railway Expert or Officer with whom you are connected or acquainted please supply addresses.

If you will try one of our client's Helical Arms, he will supply one on request for that purpose. They are, however, cheap to make, and he would consent to your making and trying the invention in respect of one engine, or a few.

There is no TABLET EXCHANGE other than our Client's that will enable exchanging to be done while the train is running at up to 60 or more miles an hour.

In the margin of this letter is a list of Clark's Patents. This includes your country; and it is important to note that the Government Officials DID NOT CITE ANY PATENT WHATSOEVER AS AN ANTICIPATION of what is claimed, either in Great Britain or the United States.

Mr. Clark will allow the invention to be made on royalty, or will sell the Patent, or arrange for filling orders from Railway Authorities willing to use Tablet Exchangers. Will you state which course would suit you. If there is any particular manufacturer you prefer kindly let us know.

There is no other arrangement the equal of the CLARK TABLET EXCHANGER we understand, and shall be thankful for particulars if there be produced any other tested device of the kind.

Yours faithfully,

E. G. Turrell

Notes on Clark's Tablet Exchanger for Train Running.

Nearly 20 years ago the New South Wales Government adopted for Tablets a mechanical Exchanger, which was so intricate that the Regulations limited the speed of the locomotive at the moment of exchange to 25 miles an hour.

In 1908 the apparatus was still used, but proved extremely unsatisfactory by causing important fast trains to lose much valuable time. The engines were found to knock the Tablet off the supporting arm on to the road, instead of picking it up. Tablets would thus become lost, especially at night, causing the trains much delay, disorganising traffic generally, requiring a pilotman from the other end of the section to pilot the train through, and so on. A pilotman was at times kept working for days till the Tablet was found. Sometimes the Tablet lodged in the under-frame of a carriage, and was there discovered after a week's search.

Eventually the above Exchanger (the "Quirk") was costing for repairs, in at least 3 Government repair shops, an excess of £100 per shop in wages alone.

In 1908 a Steam Shed Inspector of the New South Wales Railways, Mr. William Clark, patented an improved Tablet Exchanger, having fitted on the engine a twisted arm which came to be known as the "Ram's Horn." Its advantages were simplicity, effectiveness, and cheapness.

The Government authorities ordered a test, and had eight officers present to report. When Mr. Clark was asked to instruct the engine-drivers, he said: "No instructions are needed. Let them test it as they please." The tests were made at 12, 20, 35, 45, and 60 miles respectively per hour, with the result that the eight officers reported the Clark Exchanger to be a complete success.

The authorities then had four of the principal express engines fitted with it. These have been running some 12 months, and the engine-drivers have unanimously testified that, in the whole of that time, there had not occurred a single failure of any locomotive to effect the exchange of the Tablets. The engine-men describe the Clark Exchanger as perfect, and say it can neither fail nor get out of order.

The repair for these Clark Exchangers during that year was "Nil"

The authorities are now putting the Exchanger on four additional locomotives, and will duly convert all engines having other Exchangers to the Clark system. It will cost well under £2 per engine to make the change.

A trial of the apparatus can be effected rapidly, and by arrangement, at the cost of the patentee.

The following are certificates of Government Locomotive Engine-drivers, all of whom can be personally referred to:—

First Certificate.

To Mr. W. Clark.

25th June, 1910.

I have used the new Tablet Exchanger (Clark's), commonly called the RAM'S HORN, for the past 12 months, on Express and Mail Trains, and have found it a first-class machine. It has not missed picking up or delivering a Tablet during this time.

This Exchanger has advantages over all others; being much lighter and simpler, it is easy to work; there being no springs or triggers to break, it is always in good order. It does not damage the Tablet rings or pouches when running at high speed.

During the whole time I have had this Exchanger in use it has not had any repairs or adjustment, and is still in good order. In my opinion this is far the best Exchanger in use.

WM. WHATLEY.

Locomotive Engine-driver, Goulburn, N.S.W.

Second Certificate.

To Mr. Clark,—

11th July, 1910.

THIS IS TO CERTIFY to the efficiency of your Patent Tablet Exchanging apparatus. I have been stationed at Albury as a driver on the New South Wales Government Railways for the past eight years, and have been working Express Trains with Tablet Exchanging apparatus in use for 13 years, running

Clark's Tablet Exchanger for Train Running.

200 miles a night, and exchanging Tablets 22 times. The speed at which the exchanges are made are from 25 to 50 miles an hour.

I have had your Exchanger in use on the GREAT SOUTHERN EXPRESS for the last 12 months, and during that time I can say it has never missed one Tablet.

I have tried it at a speed of 60 miles an hour, and it exchanges them without a hitch, and I can say, without fear of contradiction, that it is the best and most reliable apparatus we have EVER HAD IN USE on the New South Wales Railways.

(Signed) J. JAMES,

Express Driver, Albury, N.S.W.

Third Certificate.

W. Clark, Esq.— 8th July, 1910.

This is to certify that I am employed as engine-driver on the New South Wales Government Railways since 1882, during which time I have been employed principally as Mail and Express and Fast Express Goods driver, the engines of which have been fitted with the Tablet Exchanger.

I can safely say, without fear of contradiction, that your Exchanger is absolutely the best and safest.

My reasons for saying so are as follow:—The engines fitted with the old Tablet Exchangers, drivers are restricted to a speed not exceeding 25 miles per hour, so as to prevent the rings or the Tablet pouch from breaking.

But with your Exchanger I ran the regulation speed, and have run up to 55 miles per hour with safety. In fact, I find the harder you strike it the better, and there is no possibility of breaking a ring or a pouch, for the simple reason the ring spins round on the spindle, which breaks the force. I hope the time is

not far distant when all our locomotives are fitted with your Exchanger.

You are at liberty to use this at any place.

G. B. YOUNG,

Engine-driver, Eveleigh, N.S.W.

Fourth Certificate.

W. Clark, Esq.— July 12th, 1910.

In regard to the new Tablet Exchanger ("Clark's").

I have been working Express Mail and Passenger Trains during the past 15 years throughout N.S.W., under the Train Staff and Ticket, Electric Train Staff, and Electric Train Tablet exchanging by hand.

During the last three years I have been working Express Trains on the Southern road, where mechanical Exchangers are in use over 83 miles of the journey, Sydney to Goulburn, on which portion the Tablet is exchanged twenty times. During last year I have had in use almost continuously the "Clark" Exchanger, and find it is very reliable in working.

The regulation speed in N.S.W. for exchanging with an Exchanger is 25 miles per hour. With this machine I have tried it at various speeds up to over 50 miles an hour on a straight road, and from observation high speed is no detriment to its working.

One feature in the Exchanger under notice—there are no intricate parts likely to get out of working order when in use. The coil on exchanging arm reduces the impact to a minimum, and prevents the rings on Tablet pouch from being damaged.

I am quite safe in saying that this machine is thoroughly reliable and effective.

GEORGE CROSSMAN,

Engine-driver, Eveleigh, N.S.W.

Notes as to Working.

(Reference should be made to the Patent Specification, which shows a locomotive with the parts in several positions. The track is furnished with an upright arm to hold the Tablet ring; each ring has a leather pouch, which contains the Tablet; the track Tablet ring is to be exchanged for a ring carried by the locomotive. In a pamphlet entitled "The Clark Tablet Exchanger" are four photographs of an express locomotive showing different positions. The track upright arm is, as the photograph shows, in practice swung down into a box or recess on the ground when the exchange is not about to be made.) These photographs are, for convenience, reproduced here. (See last page).

Photograph 1 shows the front point of the "Ram's Horn" when it has just entered the ring, which is held up by the ground arm standing in the "6 foot." The ring carried by the engine is being entered by a point which projects from the ground arm. The locomotive is the Sydney to Melbourne Express.

Photograph 2 shows the engine on the same position from another view-point, but it will be seen plainly that the "Ram's Horn" has entered the ground ring, and ground arm point has entered the engine ring. The pillar is seen supported by a stay—it can be dropped by pulling out a pin.

In photograph 3 the engine is supposed to have moved a yard forward. Hanging to the "Ram's Horn" is seen the ring with pouch and Tablet, and on ground arm is seen the ring transferred from the engine in effecting the exchange.

In photograph 4, at the top centre of picture, is seen part of the fireman's arm. He holds the ring, which he is taking off the "Ram's Horn" to hang in the cab. On the ground a man has taken the ring off the pillar. He is also allowing, with the other hand, the pillar to drop to the ground.

The exchange is by two ground Exchangers at each station, one for down trains and one for up. One is fixed, say, at the bottom of the ramp at end of a platform, the other in the "6 foot," between the main line and the crossing loop.

A "Ram's Horn" device is fitted on the engine to the left, trailing splasher, and is attended to by the fireman. When approaching the station he places the Tablet pouch contain-

ing the incoming Tablet into the pocket of the "Exchanger," and lowers this Exchanger into a suitable position.

When the engine passes the distant signal, the fireman will put the incoming Tablet, contained in the leather pouch, into the brass pocket on the engine Exchanger; after passing the home signal, the fireman lowers the twisted arm into position by a lever and connecting rod. A spring clip keeps the ring in proper position.

The station-master, when he is expecting the train, raises the ground arm or post till it is upright, and places the Tablet pouch, containing the outgoing Tablet for the section ahead, into the pocket of the Exchanger, which is attached at the proper angle; all parts are then ready for an exchange.

When the exchange is made, the fireman heaves up the twisted arm, removes the Tablet and pouch, sees that he has the right Tablet, and hangs it in the cab till the next station is approached.

When the exchange has been effected automatically by the locomotive (going at, say, full speed), the ground and the engine apparatus can be put out of position till the next exchange is required.

Clark's Patent includes a twisted arm, or "Ram's Horn," on the engine, and employs a specially set pocket on the vertical ground arm.

Clark's "Ram's Horn" picks up in N.S.W. regularly at 50 miles per hour, and, when required, at 60, or slower if preferred. In picking up rings they are not damaged or distorted. A helical arm can be put on the ground Exchanger for specially fast exchanges. The rings have any suitable diameter. Steel wire rope of half-inch diameter, made into a ring of 6-inch diameter, serves well.

On the engine it is well to bolt a plate to the back of the trailing splasher, with slotted holes to permit of adjustment of the plate as the tyres of the wheels get thin—or any regulating bolt can be used.

European Railway authorities or other experts, on application direct, or to any European representative of G. G. Turri & Co., Patent Attorneys, Rialto, Melbourne, Agents for William Clark, Patentee, may obtain any further information desired.

Patent No. 13,284/08

Application Dated 15th December, 1908.

COMMONWEALTH OF AUSTRALIA.

COPY OF COMPLETE SPECIFICATION.

"Improvements in Exchangers in Tablet Systems of Railway Traffic Control."

I, WILLIAM CLARK, of Junee, in the State of New South Wales, and Commonwealth of Australia, Steam-shed Inspector of the Railways of the said State, hereby declare this invention and the manner in which it is to be performed to be fully described and ascertained in and by the following statement:—

This invention refers to Tablet systems of railway traffic control wherein the Tablet giving permission to enter a block is mechanically taken from a ground Exchanger or stationary holding device by an engine Exchanger or picking-up device on the locomotive. And these improvements relate to the constructions of said ground Exchanger and of said engine Exchanger whereby the operation of exchanging or picking up is effected with more certainty and more facility than heretofore.

A ground Exchanger according to these present improvements, instead of having the Tablet hanging by a ring or bail from an arm, presents said Tablet to the oncoming locomotive with its ring or bail downwards, and with its pouch in a pocket or homing on an inclined support or stay from the top of the mast.

And an engine Exchanger according to this invention, instead of having a ram or straight stem with a spring and trigger and pads (which are constantly breaking and getting out of order), has a curved or rather a corkscrew stem, without springs, triggers, pads, or the like, and preferably made of round spring steel.

In order to illustrate the invention carried out practically, the same will now be described with reference to the drawings accompanying and forming part of this Complete Specification.

Figure 1 is a perspective view of a locomotive passing a ground Exchanger, and about to take a Tablet pouch from the latter, and to allow said latter to take a Tablet pouch from the former, and

Figure 2 is portion of the same view after the exchange has been effected.

Figure 3 is an enlarged perspective view in part of the exchanging devices, and

Figure 4 a similar view from another aspect.

The ground Exchanger comprises a post 5 with a top bend 6 towards the track to which top is affixed the arm 7 on whose end is the inclined spring holder 8 for the despatching Tablet. And on this post 5 is the receiving arm 9 for the terminal Tablet.

The Tablet comprises the Tablet 10 or 15 in its pouch 11 or 20 and having exchanging ring or bail 12 or 21.

The engine Exchanger comprises a curved or corkscrew receiving arm 13 running along the side of the engine and at its back and having inclined spring holder 14 for the terminal Tablet 15. The whole is affixed or is part of lever 16 operated by rods 17 and handle lever 18 to elevate it closer to the side of the engine.

In operation the despatching Tablet 10 in its pouch 11 is placed in the inclined spring holder 8 and its ring or bail 12 is presented downwardly and towards the track. The terminal Tablet 15 in its pouch 20 is placed in the spring holder 14 of the engine Exchanger and this by means of handle lever 18 is lowered into operable position.

As the engine passes the ground Exchanger (see Figure 1) the point of the corkscrew arm 13 enters the ring or bail 12 and pulls the Tablet 10 in pouch 11 from out of the holder 8. When this is free the ring or bail 12 swings around said corkscrew arm 13 (see Figure 2) and is gradually braked or stopped by the resistance of the atmosphere and comes to rest on said arm 13 without clatter or impact. Then the arm 9 enters the ring 21 of the terminal Tablet 15 and pulls this to from the spring holder 14. The engine Exchanger is then returned to inoperative position and the Tablet 10 removed therefrom.

Having now fully described and ascertained my said invention, and the manner in which it is to be performed, I declare that what I claim is:—

First.—In Exchangers in Tablet systems of railway traffic control a ground Exchanger having its spring holder for the Tablet and pouch set angularly so that the ring or bail of the pouch hangs downwardly and towards the track substantially as herein described and explained.

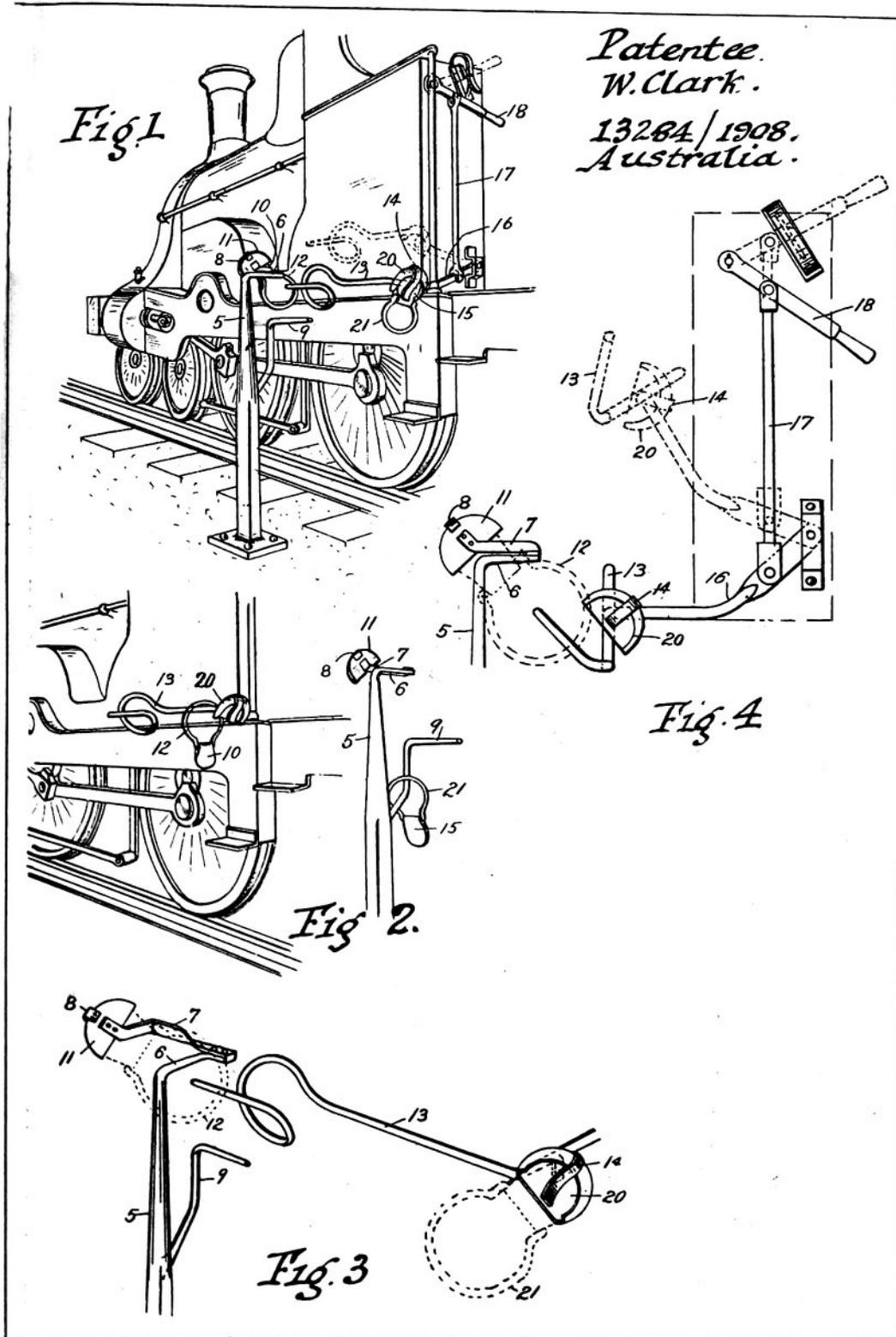
Second.—In Exchangers in Tablet systems of railway traffic control on the engine a taking off or receiving arm having a helical or corkscrew twist or twists therein substantially as herein described and explained.

Third.—In Exchangers in Tablet systems of railway traffic control a ground Exchanger and an engine Exchanger constructed of the parts for the purposes set forth substantially as herein described and explained and as illustrated in the drawings.

Dated this nineteenth day of March, A.D. 1909.

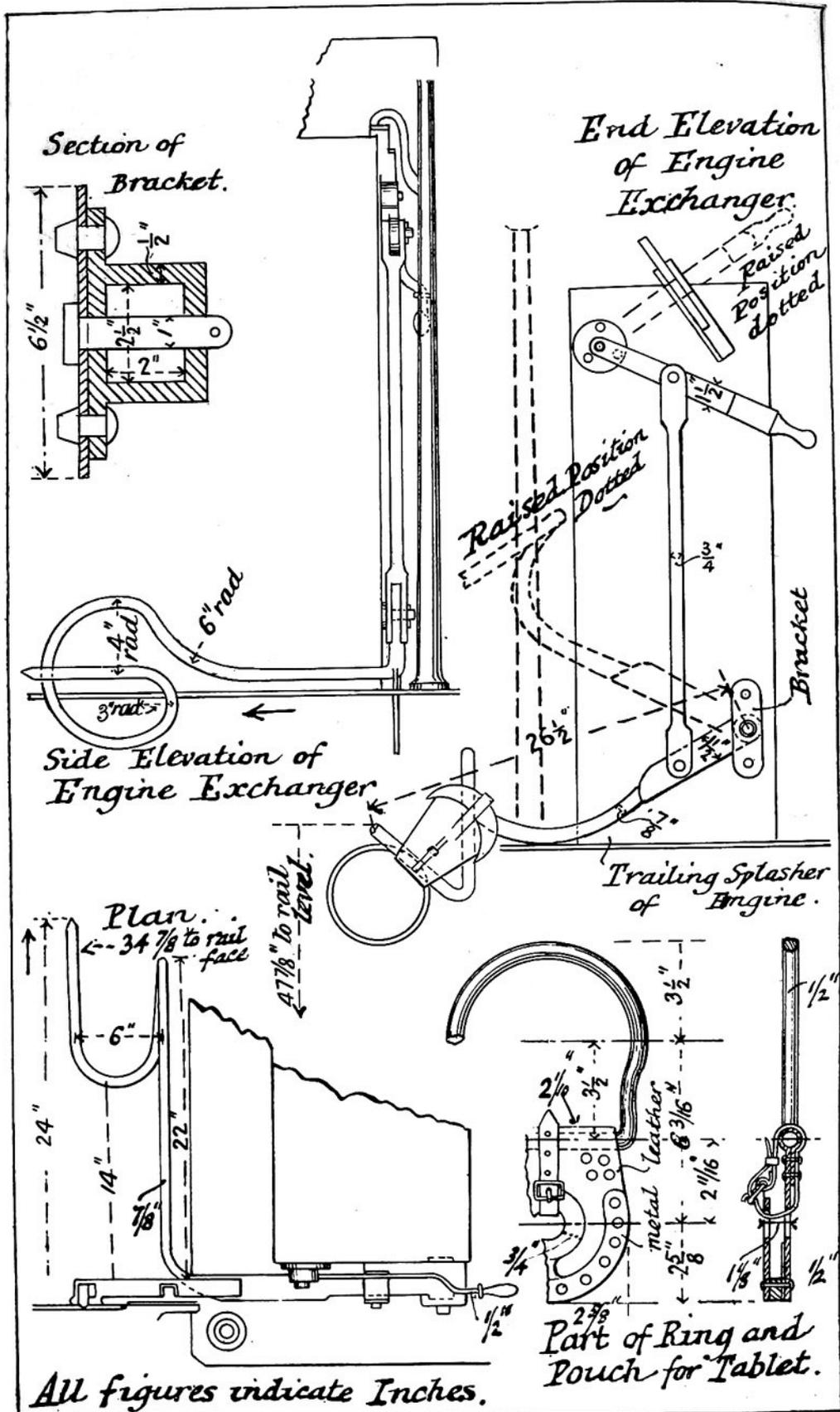
Apply G. G. Turri & Co., Patent Attorneys, 499 Collins St., Melbourne, Australia, or their Agents in each Country,
for any further information.

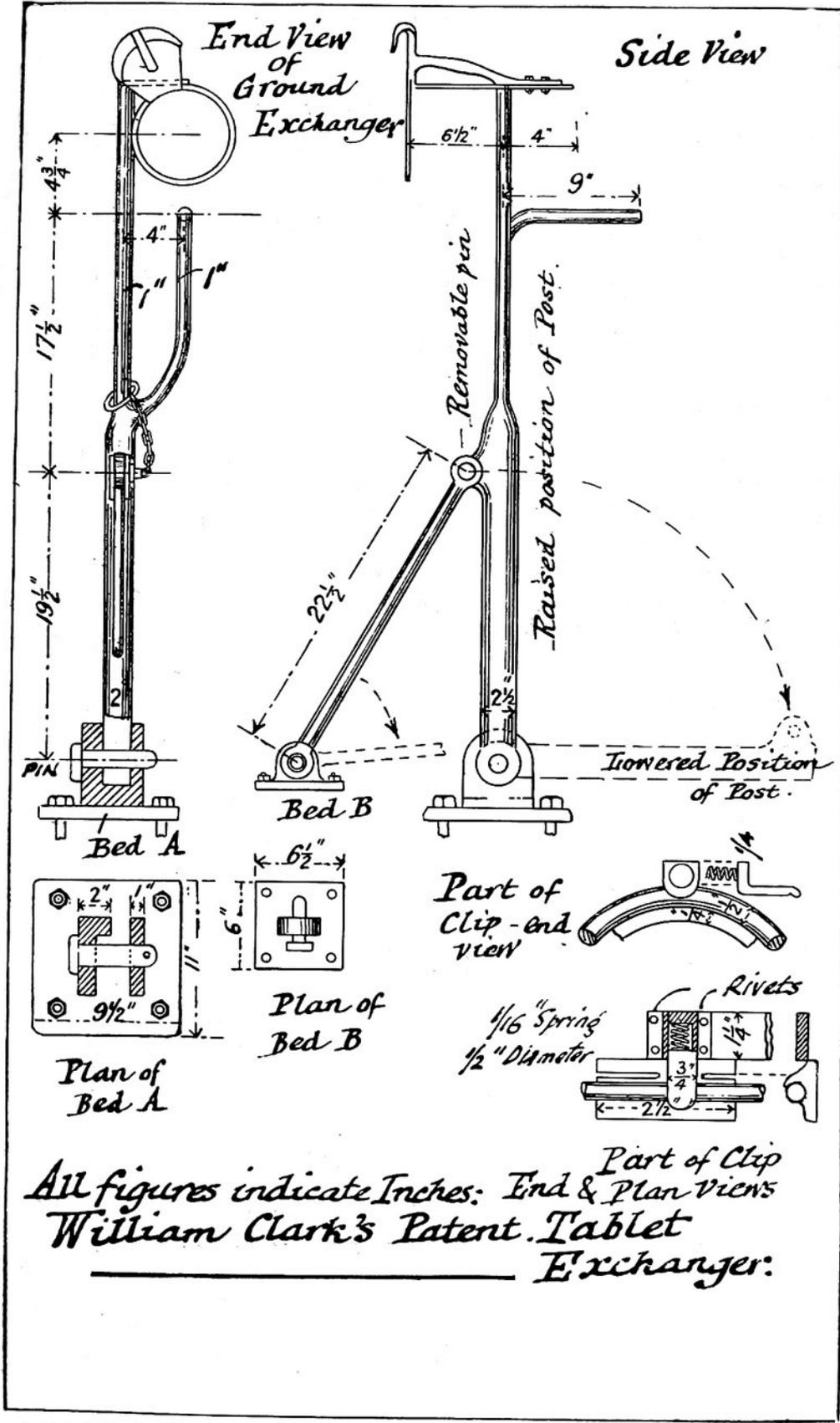
Clark's Tablet Exchanger for Train Running.



Apply G. G. Turri & Co., Patent Attorneys, 499 Collins St., Melbourne, Australia, or their Agents in each Country, for any further information.

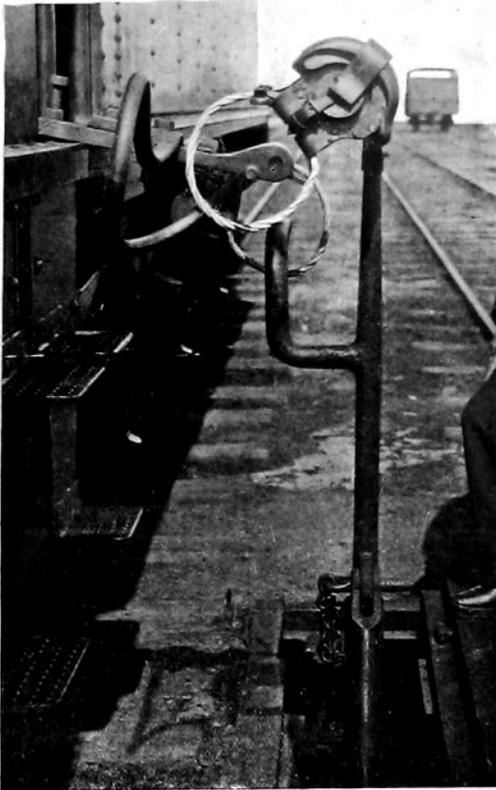
Clark's Tablet Exchanger for Train Running.



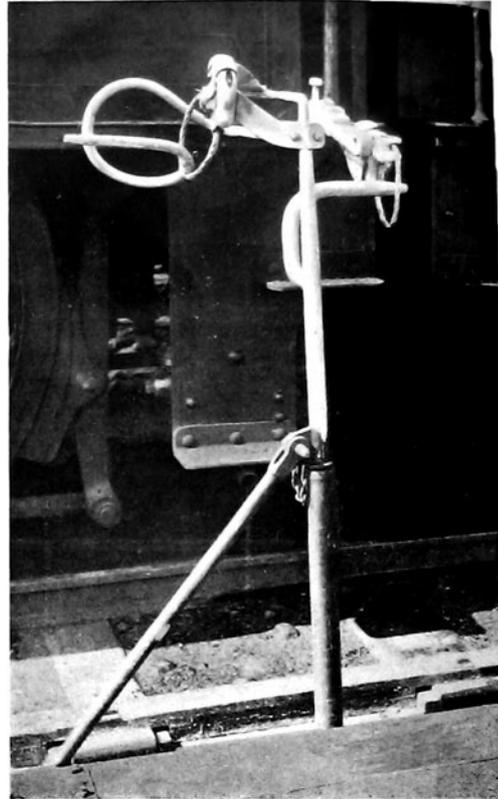


Apply G. G. Turri & Co., Patent Attorneys, 499 Collins St., Melbourne, Australia, or their Agents in each Country, for any further information.

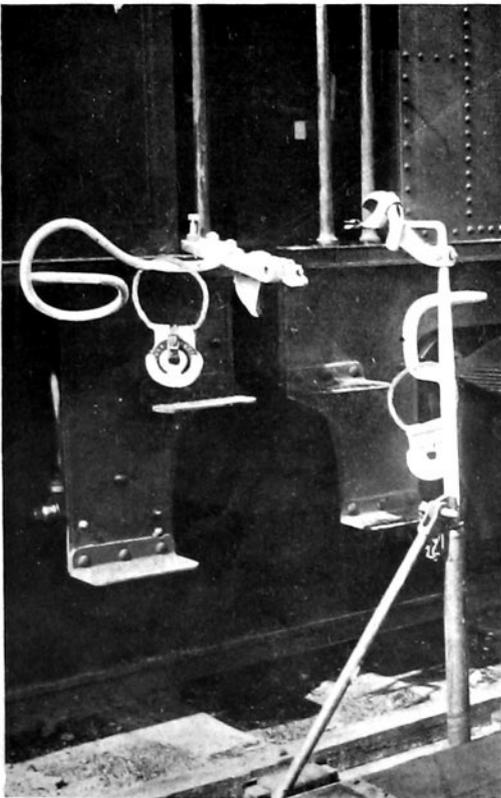
Clark's Tablet Exchanger for Train Running.



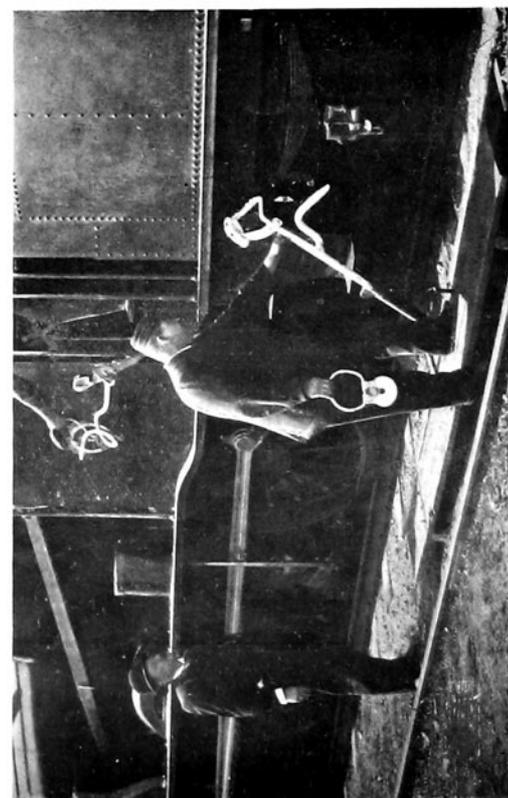
No. 1.—Looking along the Track.



No. 2.—On the point of Exchanging



No. 3.—After exchange is made.



No. 4.—Removing the Tablets and putting the Apparatus out of Work.