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Engineering Standard – NSW

Category
Signalling

Title
The Claw Lock Mechanism Description and Operation

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Document Control

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The technical content of this document has been approved by the relevant ARTC engineering authority and has also been endorsed by the ARTC Safety Committee.

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About This Standard

This manual describes the operation of claw locks on turnouts and swing nose crossings and details the procedures to be followed to install, test and maintain the claw locks and their operating mechanisms.

The manual also contains descriptions of switch rollers and the procedures to install adjust and maintain these rollers.

There are 6 parts to the manual: -

Part 1	SMS 05	Claw Lock Mechanisms - Description and Operation
Part 2	SMS 06	Claw Lock Mechanisms – Safety and Functional Tests / Routine Maintenance
Part 3	SMS 07	Claw Lock Mechanisms – Overhaul
Part 4	SMS 08	Claw Lock Mechanisms - Installation on Turnouts
Part 5	SMS 09	Claw Lock Mechanisms - Installation on Swing Nose Crossings
Part 6	SMS 10	Switch Rollers

Document History

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List of Amendments –

ISSUE	DATE	CLAUSE	DESCRIPTION
1.1	01/09/2004		▪ Reformatting to ARTC Standard
1.2	14/03/2005	Disclaimer	Minor editorial change

Contents

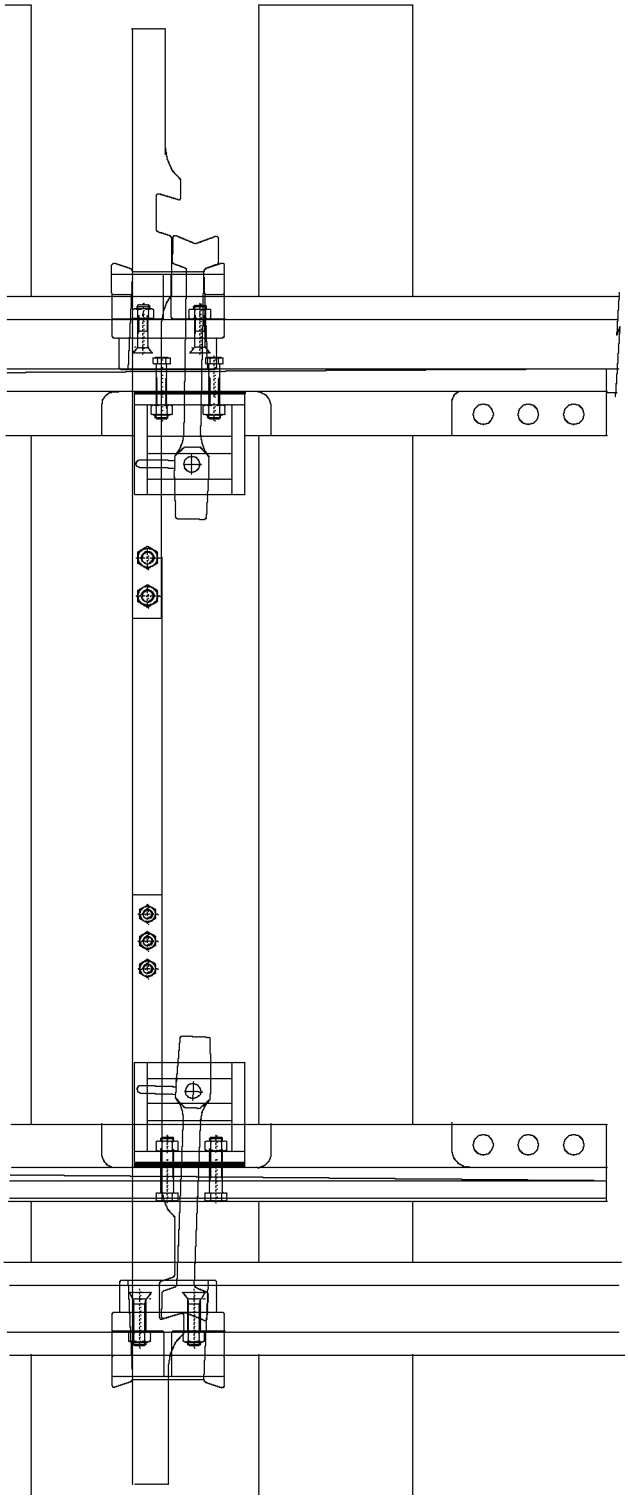


Figure 1.1 - Claw Lock Assembly on turnout

1 Claw lock description

The claw lock type of mechanism was introduced into railways in Europe more than 50 years ago and is currently in common usage in a number of forms. The mechanism was first introduced into NSW at Glenfield where it was used to drive and lock the swing nose V-crossings on the 1 in 21 medium speed turnouts.

The Claw lock is a device in which the drive and facing point lock for the points are combined into a single mechanism. It provides direct locking between each switch and stockrail and any form of manual, electrical, pneumatic or hydraulic mechanism that can provide the required drive travel may power it.

It is suitable for 60kg conventional turnouts and 60kg tangential turnouts in main line application and 53 and 47kg turnouts in sidings and yards. Depending on the drive mechanism used, the claw lock may be trailable or non-trailable.

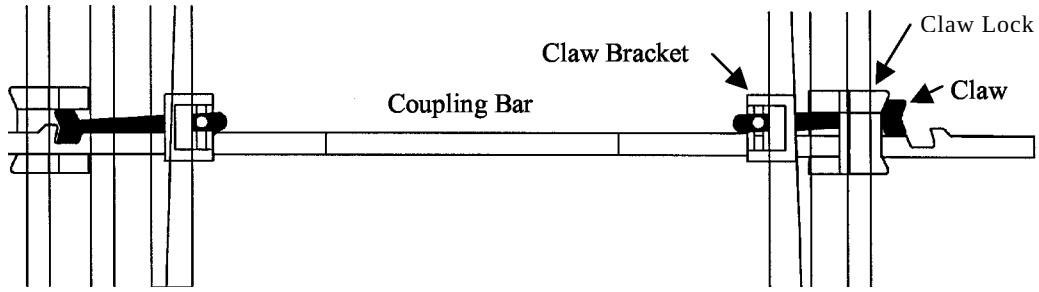
There are no fixed gauge rods (stretchers, front rods, backs rods) connecting the switches since the switches must be able to move independently of one another at each end of the drive stroke to allow the claws to unlock and lock. Conventional 60, 53 and 47 kg turnouts do, however, require a slotted “anti-roll” stretcher to be fitted to prevent excessive switch roll caused by the claw rolling the foot of the switch in towards the stockrail.

The mechanism itself consists of cast steel claw locks bolted to each of the stockrails between the “A” and “B” timbers and, if a backdrive is required, to each of the stockrails at the point of backdrive.

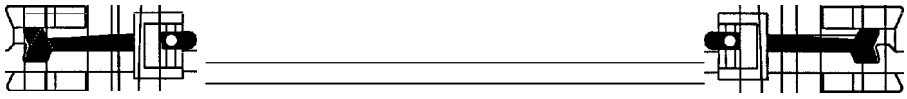
A claw bracket is bolted to each switch blade and this supports a locking claw pinned or bolted to the bracket such that the claw can swing in the horizontal plane.

An operating bar connects the locking claws on each side but is not physically fastened to claw, switch or stockrail.

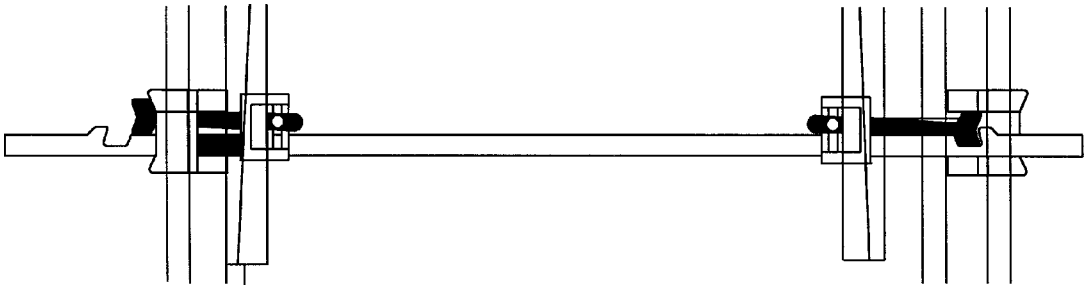
Figure 1.1 shows an assembled claw lock installation on a tangential turnout.



Right hand switch closed and locked



Points in transit



Left hand switch closed and locked

Figure 2.1 - Claw Lock Operation

2 Claw lock operation

2.1 On points

Providing a driving force to one end of the coupling bar actuates the mechanism. This may be done with an electric mechanism, a pneumatic cylinder, a hydraulic cylinder or a mechanical lever.

Using Figure 2.1 for reference

The top drawing shows the switch at the right of the diagram in the closed and locked position. The tail of the locking claw is hooked around the locking face of the claw lock and is held in this position by the coupling bar.

The switch at the left of the diagram is held in the open position by the tail of the claw being constrained within the notch in the coupling bar and being still within the claw lock.

To move the points force is applied to move the coupling bar to the left. The open switch will immediately commence to move towards the closed position.

When the notch in the top of the coupling bar is opposite the tail of the claw of the closed switch, the claw will release from behind the claw lock into the notch and free the switch.

Continued movement of the coupling bar will move both switches until the switch at the left of the diagram is closed and its claw hooks behind the locking face of the claw lock.

The operating bar then travels past the claw and locks it behind the claw lock, at the same time completing the open switch travel.

When a trailable mechanism is attached to the coupling bar, the claw lock can be trailed without damage and operation is as follows:

As the train wheel rolls towards the tip of the switch from the “V”-crossing, it tries to force the open switch towards the closed position. When the force on this switch reaches a predetermined level it will release a clutch or similar in the drive mechanism which frees the coupling bar to move.

As the wheel forces the open switch towards the closed position it will move the coupling bar through its locking claw which is engaged in the notch in the bar.

Once the switch and bar have moved approximately 45 - 50 mm, the locking claw on the closed switch will be freed from behind the claw lock, and will allow the closed switch to open.

Generally points which have been trailed will be neither normal nor reverse after the trailing movement. It will be necessary for the signaller to re-stroke the points unless automatic normalising has been provided.

The claw lock mechanism may also be used on single blade catchpoints. A claw lock is fixed to the stockrail opposite the switch and this acts as a guide for the coupling bar. On the switch side, the assembly is identical to that of a full set of points.

It is also possible to use the claw lock mechanism on single and double slips. However, this does require some modifications to the standard assembly. For example, it is necessary to dispense with the claw bracket on the switch or switches in the "V" of the slip and pin the claw directly to the flange of the switch. To maintain commonality of parts the opposite switch is treated in the same manner.

Fig 2.2 - Single Slip fitted with Claw Locks

Figure 2.3 – Single slip, claw pinned directly to switch flange

2.2 On Swing Nose V Crossings

Again, providing a driving force to one end of the coupling bar actuates the mechanism.

Using figure 1.3 for reference

The swing nose is held closed against the right hand wing rail by the right hand claw being driven out behind the claw lock by the coupling bar. The claw lock may be attached directly to the wing rails but is more commonly attached to a bracket fixed to the rail plates supporting the wing rail.

Note also that the slots in the coupling bar into which the claws fit are longer than those in the coupling bar for points. As both claws are fixed to the swing nose (In effect a single double sided switch), the coupling bar must be able to move to clear the locked claw before contacting the unlocked claw.

Force applied to the coupling bar moves the bar to the left and allows the locked claw to fall into the slot in the bar. The bar then contacts the back of the unlocked claw and moves it and the swing nose across to the left hand wing rail.

When the swing nose contacts the wing rail, the coupling bar continues to move forcing the claw out behind the claw lock and locking it in place.

Claw lock installations on swing nose crossings are always non-trailable since pressure on the swing nose cannot move the coupling bar. In fact pressure will tend to increase the friction between claw and claw lock and will prevent release.

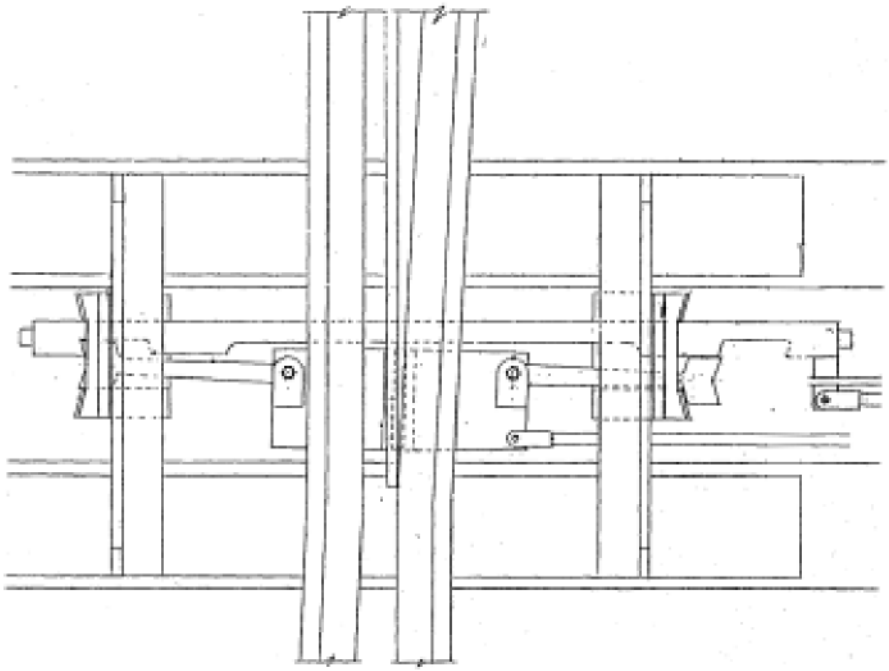


Figure 2.4 – Claw lock on swing nose crossing

Figure 2.5- VAE Swing Nose Crossing equipped with claw locks

Fig 2.6 – PRE 1 in 24 Swing Nose V Crossing equipped with claw locks

Fig 2.5 – PRE 1 in 12 to 15 Swing nose V crossing equipped with claw locks

3 Terminology

Name used in this manual	Name which may be used in other publications
Coupling bar	Operating bar
Drive rod	Throw rod
Jaw	Clevis
Crossing base frame	Crossing base plate
Point Machine Throw bar	Point machine operating bar

