Thirty-Fifth Annual Report

OF THE

Railroad and Warehouse Commission

OF THE

STATE OF ILLINOIS

Railroads for the Year Ending June 30, 1905.
Grain Inspection Department for the Year Ending Oct. 31, 1905.
Office Expenses for the Year Ending Nov. 30, 1905.

COMMISSIONERS:

JAMES S. NEVILLE, Bloomington, *Chairman.*
ARTHUR L. FRENCH, Chapin.
ISAAC L. ELLWOOD, DeKalb.
WM. KILPATRICK, Chicago, *Secretary.*
CHAS. J. SMITH, DuQuoin, *Ass't. Secretary.*
FRANK J. EWALD, Chicago, *Consulting Engineer.*

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1906.

INTERLOCKING DEVICES.

Statutory Provisions and Rules Governing Same.

STATUTORY PROVISIONS.

Act relating to crossings on the same level; approved June 3, 1887, in force July 1, 1887.

AN ACT in regard to dangers incident to railroad crossings on the same level.

SECTION 1. That when and in case two or more railroads crossing each other at a common grade, or any railroad crossing any stream or harbor by swing or draw bridge, shall by a system of interlocking and automatic signals, or by other works, fixtures and machinery, to be erected by them, or either of them, render it safe for engines and trains to pass over such crossing or bridge without stopping, and such system of interlocking and signals, works or fixtures shall first be approved by the Railroad and Warehouse Commissioners, or any two of them, and a plan of such interlocking and signals, works and fixtures, for such crossing, designating the plan of crossing, shall have been filed with such Railroad and Warehouse Commissioners, then, and in that case, it is hereby lawful for the engines and trains of any such railroad or railroads to pass over such crossing or bridge without stopping; any law, or the provisions of any law, now in force to the contrary notwithstanding; and all such other provisions of law contrary thereto are hereby declared not to be applicable in such case: *Provided*, that the said Railroad and Warehouse Commissioners shall have power in case such interlocking system, in their judgment, shall, by experience, prove to be unsafe or impracticable, to order the same to be discontinued. [As amended by act approved May 28, 1891.

§ 2 The said Railroad and Warehouse Commissioners may appoint a competent civil engineer to examine such proposed system and plans, and report the result of such examination for the information of such Railroad and Warehouse Commissioners, and said Railroad and Warehouse Commissioners are hereby authorized to allow and reward $5 per day as a compensation for the services of such civil engineer, or such reasonable sum as such commissioners shall deem fit, and to allow and reward such other and further sums as they shall deem fit to pay all other fees, cost and expenses to arise under said application, to be paid by the railway company or companies in interest to be taxed and paid or collected as in other cases. And the said Railroad and Warehouse Commissioners are also empowered, on application for their approval of any such system of interlocking and signals, works or fixtures, to require of the applicant security for such fees, costs and expenses, or the deposit, in lieu thereof, of a sufficient amount in money for that purpose, to be fixed by them.

APPROVED June 3, 1887.

ILLINOIS INTERLOCKING ACT, APPROVED JUNE 2, 1892.

AN ACT to protect persons and property from danger at the crossings and junctions of railroads by providing a method to compel the protection of the same.

SECTION 1. *Be it enacted by the people of the State of Illinois, represented in the General Assembly:* That in every case where the main tracks of two or more railroads cross at a grade in this State, any company owning or operating any one of such tracks, whose managers may desire to unite with others by protecting such crossing with interlocking and other safety devices, may file with the Railroad and Warehouse Commission a petition stating the facts of the situation, and asking said Railroad and Warehouse Commission to order such crossing to be protected by interlocking signals, devices and switches, or other safety appliances. Said petition shall be accompanied by a plat showing the location of all tracks; and upon the filing thereof, notice shall be given to each other company or person owning or operating any track involved in such crossing, and the said Railroad and Warehouse Commission shall thereupon view the site of said crossing, and shall as soon as practicable, appoint a time and place for the hearing of such petition.

§ 2. If the said Railroad and Warehouse Commission shall, from information obtained in any manner, have cause to believe that any such grade crossing as described in section 1 of this act, is dangerous to the public, or to persons operating trains, and requires protection, then it shall be the duty of the said commission, without any petition, and of its own motion, to cite the several companies or persons owning or operating the railway tracks forming such crossing, to come before said commission at such time and place as may be named, and show cause why they should not be required to provide such crossing with interlocking or other safety appliances.

§ 3. At the time and place named for hearing under any petition filed in pursuance of section 1 of this act, or in any citation issued in pursuance of section 2 thereof, unless the hearing is for good cause continued, said Railroad and Warehouse Commission shall proceed to try the question whether or not the crossing shall be protected by interlocking or otherwise, and shall give to all companies and parties interested an opportunity to be fully heard, and said commission shall after such hearing, enter an order upon a record book or docket, to be kept for the purpose, denying the petition or discharging the citation if the protection of such crossing as proposed is deemed unnecessary, or, if said commission shall be of opinion, from the evidence and facts produced, that the public good requires that such crossing be protected then the commission shall enter an order prescribing an interlocking device or equipment for such crossing, in case the companies interested cannot agree upon a device, in which order shall be specified the kind of machine to be used, the switches, signals and other devices or appliances to be put in, and the location thereof, and all other matters which may be deemed proper for the efficient protection of such crossing, and said commission shall further designate in said order the proportion of the cost of the construction of such plant and of the expense of maintaining and operating the same, which each of the companies or persons concerned shall pay. In case, however, one railroad company shall hereafter seek to cross at grade with its track or tracks, the track or tracks of another railroad company, and the Railroad and Warehouse Commission shall determine that interlocking and other safety appliances shall be put in, the railroad company seeking to cross at grade shall be compelled to pay all costs of such appliances, together with the expense of putting them in and future maintenance thereof.

§ 4. It shall be the duty of every railroad company or person owning or operating any track involved in any such crossing to comply with and carry out fully, or unite with the others in doing so, any order of the said Railroad and Warehouse Commission made in pursuance of any proceedings instituted or had under this act, such work to be completed within ninety days after such order is made, unless the Railroad and Warehouse Commission shall, for good cause shown, extend the time, and when any such plant shall have been completed and made ready for use, it shall be the duty of the companies or persons concerned to notify the said Railroad and Warehouse Commission thereof, whereupon said commission shall inspect or cause to be inspected

the said completed plant in the same manner as is now provided in the act upon that subject, approved June 3, 1887; and if, upon such inspection, the said plant is deemed to be well constructed and suitable and sufficient for the purpose, the said Railroad and Warehouse Commission shall issue a permit empowering the several companies or persons owning or operating the tracks involved therein to run such crossing without stopping under such rules and regulations as may be in force, or may thereafter be adopted, by the said commission, any law now in force upon the subject of stopping trains at railway crossings to the contrary notwithstanding.

§ 5. Any company, person or corporation refusing or neglecting to comply with any order made by the said Railroad and Warehouse Commission in pursuance to this act shall forfeit and pay a penalty of $200.00 for each week of refusal and neglect, the same to be recovered in an action of debt in the name of the People of the State of Illinois, and to be paid, when collected, into the county treasury of any county where any such suit may be tried.

§ 6. All expenses incurred in any proceeding under this act shall be paid by the railway companies concerned, in equal portions, upon bills to be rendered by the secretary of said commission.

§ 7. Every junction of two or more railroad tracks, whether the tracks joining each other are owned by different companies or by the same company, shall be taken and deemed to be a crossing within the meaning of this act: *Provided*, that this section shall not apply to switch, spur or side tracks.

(*For rules governing the construction of interlocking devices, see next page.*)

RULES GOVERNING THE INSTALLATION OF INTERLOCKING DEVICES.

For the information of railroad officials contemplating the construction and operation of interlocking devices for the protection of grade crossings and junctions, in accordance to the statutory provisions governing the same, as defined in the foregoing acts, the following General rules and specifications are adopted and will be held as requirements by the Railroad and Warehouse Commission, where the approval of any such interlocking signals and switches or permit for operating the same is applied for, as provided in the several acts of the General Assembly concerning interlocking:

INFORMATION TO BE FILED WITH THE SECRETARY OF THE COMMISSION WITH PETITION FOR APPROVAL OF ANY PLAN, AND FOR INSPECTION OF ANY INTERLOCKING SYSTEM.

I.

Request for approval of plan.

Prior to the commencement of the erection of an interlocking system there should be filed with the secretary of the commission, for approval of or amendment by the consulting engineer, a complete plan, in duplicate, showing the location of all main tracks, sidings, switches, cross-overs, spur tracks, buildings and other obstructions to the view at or in the vicinity of the crossing or junction to be protected; also showing the proposed location of all switch points, signals, locks, detector bars, towers, etc.—the same to be fixed by measurements indicated by plain figures, or by a plan drawn to a scale of not less than 50 feet nor more than 100 feet, to one inch.

The grade of each track per 100 feet must be shown on the said plan, also the direction in which trains are moved thereon. All tracks must be marked "main," "side," "transfer," etc., according to use.

At each switch, derail, signal, detector bar, lock, etc., shown on the said plan there must be marked the number of the lever to operate the same.

II.

Plan of completed system.

A petition for inspection of any interlocking system, filed as provided in the acts of 1887 and 1891, must be accompanied by a plan similar to that described in Article I, with all corrections made thereon that may be necessary to show the interlocking system as completed.

III.

A complete diagram of locking must be furnished with petition for inspection of any interlocking system. This diagram must correspond with the arrangement of locking dogs as finally located and fixed. Diagram of locking.

IV.

A manipulation sheet showing the combination necessary to be set up for each of the several routes governed by signals must be furnished with petition for inspection. Manipulation sheet.

V.

Where special instructions are issued for the guidance of employés using the tracks within the limits of an interlocking system of unusual complexity, a copy of such instructions should be furnished with the petition for inspection. Copy of rules.

IMPORTANT REQUIREMENTS AND RECOMMENDATIONS FOR GUIDANCE IN CONSTRUCTION.

VI.

It being desirable that a uniform system of signals shall be used at all interlocking systems, it is recommended that all signals should be of the semaphore type. All signals must be so constructed as to go to the danger position by force of gravity in case the connections between the operating lever and the signal are broken. All signals must be provided with a lamp, showing front lens properly focused, and a back light, except as hereinafter provided. Styles of signals.

VII.

The home signal should, when practicable, be located on the engineman's side of the track it governs, and should not be less than fifty (50) feet nor more than two hundred (200) feet in advance of the point it governs, except when special conditions exist. The signal must point to the right of the track it governs, and should have a square end. When the derail or facing point or crossing is set against the train movements governed by the home signal, the signal must be locked in a horizontal position, showing red, or danger color light by night, indicating "danger—stop." When the track it governs is clear and safe for the passage of trains the signal may be inclined at an angle of about sixty (60) degrees or more from the horizontal, showing a white line or clear light by night to approaching train, indicating "clear track—advance." In case two signal arms are used on the home signal post the top signal should in all cases govern main of high speed routes, and the lower signal the diverging route or routes. In mechanical interlocking systems, the home signal may be worked by either pipe or wire connections. In case wire is used there must be two lines. Home signal.

VIII.

Distant signals.

The distant signals should be located not less than twelve hundred (1,200) feet in advance of the home signal with which it operates, on the same side of track, with the arm pointing in the same direction. The distant signal should be distinguished by a notch cut in the end of a semaphore arm. It must be so arranged and connected with the home signal that it will be held in a horizontal position, showing green or caution color light by night to approaching train when the home signal indicates danger. The distant signal must be worked by two lines of wire.

IX.

Switch indicators.

Rotating indicators, known as pot or disc signals, should only be used as switch indicators, operating with a switch.

X.

Dwarf signal.

Dwarf signals, having a small arm and suitably adapted as to height, should be similar in design and location to the home signal. They should be used only to govern movements on secondary tracks or movements against the current of traffic on main tracks when such reverse movements become necessary, and when necessary in yards.

XI.

Bracket posts.

Bracket posts should be used in all cases where it is necessary to signal trains, on different tracks, operated in the same direction from the same main post; the position of the posts on the bracket to correspond with the position of track on which movements are to be governed.

XII.

General arrangement of signals.

The signalman in the tower should be able to see the arms and back lights of all signals; the back lights of the lamps to be made as small as practicable, having regard to efficiency. When the front lights are visible to the signalman in the tower no back lights will be required. If from any unavoidable cause the arm or light of any signal can not be seen by the signalman, a repeater or indicator should be provided in the signal tower.

XIII.

Fixed lights in tower.

The fixed lights in the signal tower should be screened off so as not to be mistaken for the signals exhibited to control the running of trains.

XIV.

Derails in high speed tracks.

Where the grade is practically level, the derailing points on high speed tracks shall be located not less than five hundred (500) feet in advance of crossing or fouling point which it is intended to protect; but in case of a descending grade toward the crossing or fouling point, the derailing point must be located at such a distance from the crossing or fouling point as to give the same measure of protection that is required for level approach.

When, in the opinion of the consulting engineer of the commission, the train service and character of traffic on any high speed track is such that the above limit can be varied from, he may approve location of derails at such distance in advance of crossing or fouling point as in his judgment would give an equal measure of protection.

Guard rails will be required in interlocking systems hereafter constructed whenever the consulting engineer shall deem them necessary. Guard rails.

XV.

On secondary tracks, such as switching, drilling, storage and low speed tracks, the derail point should be located so to give the same measure of safety required for high speed tracks. Derail points on secondary tracks.

XVI.

When the crossing is made by a switching, drilling, storage or low speed track with a high speed track on which trains are moved in both directions the derail on the high speed track should be located on each side of the crossing, and at the distance therefrom indicated in article XIV. A derail should be located on the secondary tracks on each side of the crossing, according to the requirements of article XV. Derail for main track crossing secondary track.

XVII.

In case two or more secondary low speed tracks cross each other at grade, each track should be provided with a derail on each side of the crossing. The distance of the derail in advance of the crossing should be governed by the kind of traffic upon such tracks, provided that the same measure of safety is secured at such crossings as is required for the protection at crossings of high speed tracks. Derails on secondary track.

XVIII.

In case a spur, siding or switch track connects with the main track between the derail and the crossing which it protects, the spur or siding should be treated as the crossing track, and be provided with a derail in accordance with the foregoing requirements. Derails on spur tracks or sidings.

XIX.

In case of double track crossings where trains are moved on each track, as a rule, in one direction, a derail should be provided for the back-up movements, and for the further purpose of insuring clearance of crossing before clearance signal can be given on opposing route. The back-up derail should be placed not less than one hundred and fifty (150) feet nor more than three hundred (300) feet from the crossing. Derails on double track—back-up derails.

XX.

In mechanical interlocking plants all derails and point switches whether facing or trailing, must be worked either by iron or steel pipe not less than one inch in diameter. Derails—how worked.

XXI.

All slip switches, movable point frogs and derails should be locked either by separate line of connections from those used to move such slip switches, movable point frogs or derails, or by double pointed switch and lock movement of approved pattern. Locks for derails, slip switches and movable point frogs.

Where the double pointed switch and lock movement is used on high speed main tracks it must be in connection with a bolt lock operated with the home signal, which indicates the position of the facing point.

XXII.

Switch movements.

Switch movements should be located on long ties extending a sufficient distance from the rail or on other suitable foundation: and the switch movement should be further connected with the rails by a continuous plate extending under the rails, fitted with rail braces to insure accurate adjustment and maintenance of gauge of track. All ties to which lock movements or switch and lock movements are fastened should be firmly strapped to adjacent ties.

XXIII.

Detector bars.

All derails, facing point switches, skotch blocks, torpedo signals or other fixtures used in either changing the route or impeding the progress of trains shall be protected by detector bars. These detector bars must be at least fifty (50) feet in length. The first interval of the movement of the switch lever which withdraws the locking pin must at the same time raise the detector bar above the level of the rail. The final movement of the switch lever must advance the detector bar to its normal position—level with the rail. If the detector bar is not worked on the switch lever it must be actuated before the switch is moved in either direction.

XXIV.

Detector bar at crossings.

When, in the opinion of the consulting engineer of the commission it is practicable, detector bars or electric locking will be required at each crossing. Crossing bars should be interlocked with the movement that operates the derails to insure a clear crossing before an opposing route can be set or signal be given.

XXV.

Arrangement of levers in mechanical machine.

In all mechanical interlocking the levers by which points and signals are worked should be grouped in a tower and supported on a suitable foundation, which should be independent of the foundation of the tower. All levers should be pivoted on one common center. So far as may be practicable and consistent with a simplified lead-out, the levers, especially in large machines, should be so arranged that those used in any route combination shall be near together, preference being given to combinations most often set up. The levers should be numbered from left to right. The visible parts of the levers above the machine, except the finished part of the handle, should be painted as follows: Switch levers, black: lock levers, blue: switch and lock levers, black and blue; home signal levers, red: distant signal levers, green; and movable point frog levers, yellow.

XXVI.

Preliminary locking.

The locking should be actuated by the action of the latch rod, or by a device performing similar service in advance of the first movement of any lever. The first act in reversing a lever must lock the levers of all conflicting routes.

XXVII.

Locking of levers.

The levers should be so arranged that while the signals are in their normal position, *i. e.*, at Danger, the levers operating points shall be free to move: *Provided, however*, that the preliminary act of reversing any lever shall lock all signal levers controlling opposing routes. The arrangement of locking must be such as to make it impossible for the signalman to lower the signal for the approach of the train until he has first set the points in the proper position for it to pass over the route governed by such signal. The locking must be so devised as to make it impossible for the signalman to exhibit at the same moment any two signals or combination of signals that can lead to a collision.

XXVIII.

Signal towers.

Signal towers snould be so placed and of such height as to afford the best possible view of the signals and other parts of the interlocking system.

XXIX.

Automatic compensators.

Each line of pipe operating points must be automatically compensated. Such automatic compensators must be located at such intervals in the line as to completely provide for expansion and contraction at various temperatures.

XXX.

Foundation of pipe compensators and cranks.

All pipe compensators and cranks must be fixed on suitable foundations.

XXXI.

General requirements.

In case there are cross-overs, turn-outs or other connecting tracks involved in the general system upon which the movement of cars and trains present an element of danger, which danger will be enhanced by the passage of trains over crossings or junctions without stopping, and consequently at higher speed than would be the case without the permit sought, then, and in all such cases, whether such enhanced danger be of collision between different cars or trains of the same road or between cars or trains of different roads, *it will be necessary, in addition to the protection of the main crossing, to provide by the proper devices and appliances against any such increased collateral dangers in the same complete manner that is required in the case of the main crossing.* The material and workmanship must be in all respects first-class, and the entire system must be constructed in accordance with the best practice in signaling, and as a whole must, when completed, secure protection at every point within its limit, and be in every way suitable and sufficient for the purpose.

XXXII.

System to be complete when inspection is requested.

Inspection for issue of permit will not be made until the entire system is completed, connected and operated under orders to hold home signal against trains until they have made a full stop for the crossing or junction governed by such signal. And in no case will the inspection be made until all information hereinbefore specified to be furnished to the secretary shall be on file in the office of the commission.

XXXIII.

Changes in system after permit is issued.

In case any company desires to make any change in the mechanical construction, arrangement of location of any interlocking system or machine now or hereafter operated under permit of the Railroad and Warehouse Commission, or any of the parts of such system, a new or supplemental petition with amended plans, shall be filed with the secretary of the commission, showing specifically the nature of the changes proposed, and a new permit procured thereon to operate such system as changed or amended, and any such change made without a new permit first being procured in pursuance of this rule, or any change made by any company in the manner of moving cars and engines within the limit of the interlocking system not contemplated by the commission when the permit was issued, will be deemed *ipso facto* to work a forfeiture of the permit.

XXXIV.

Monthly reports of the general condition, etc., of each interlocking system.

Blank forms for monthly reports of inspection and maintenance will be supplied to each railroad company having interlocking equipment in operation under authority from the commission, and on the first day of each month it shall be the duty of the proper officer of each company to answer thereon as fully as practicable, and separately for each interlocking system or device, the questions set forth, and promptly forward the same to the consulting engineer of the commission at Springfield.

In the event of a disagreement in the reports submitted for any interlocking system or device, and where such disagreement calls in question the safe operation thereof, it shall be the duty of the consulting engineer to examine such system or device and report its condition to the commission.

Approved and adopted by the Railroad and Warehouse Commission Sept. 8, 1897.

WILLIAM KILPATRICK,
Secretary.

FRANK G. EWALD,
Consulting Engineer.