Electric Lock for Spring Switch

Standard switch rod with plunger operated by motor-driven mechanism—Automatic or remote control

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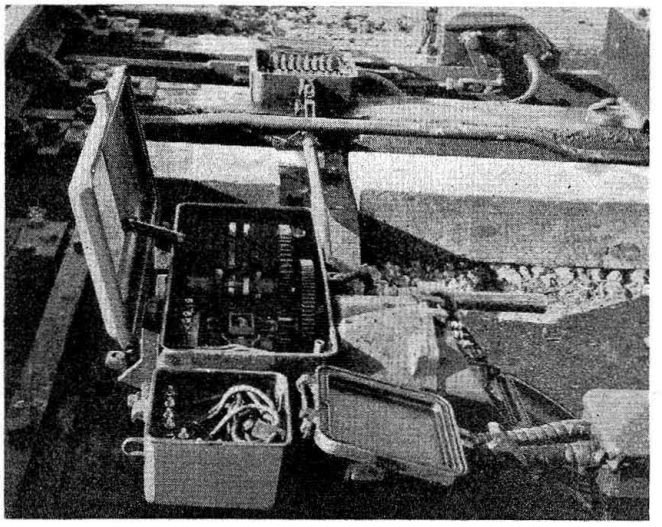


The lock plunger is operated by a motor-driven machine

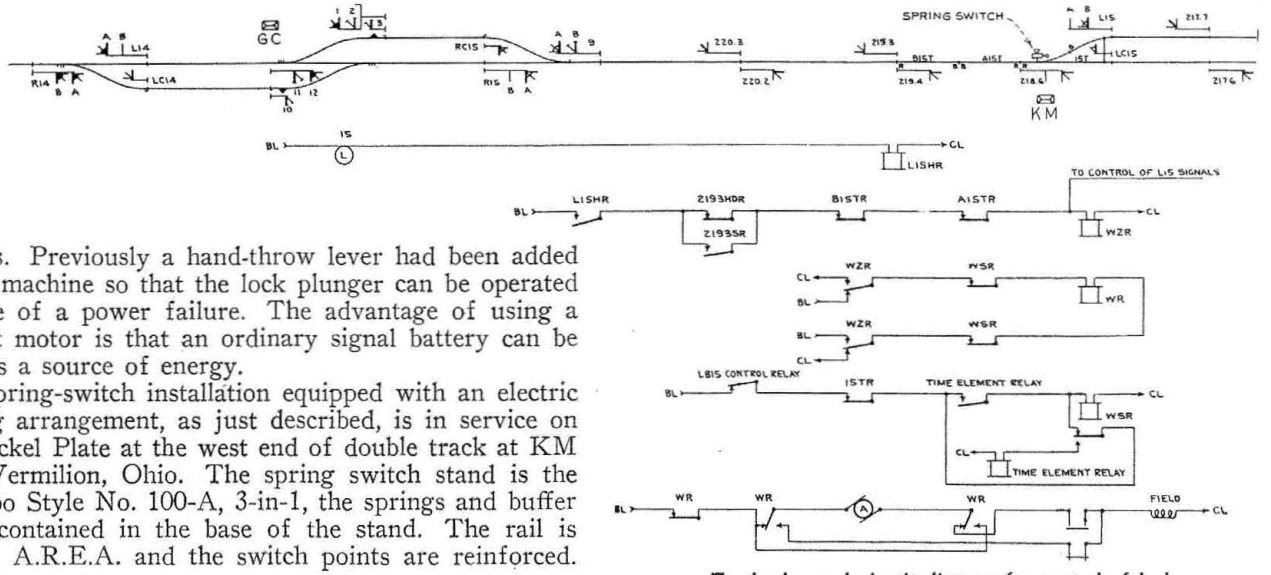
OBJECTIONS have been raised to the use of spring switches where it is necessary to operate trains at high speed in the facing direction over the switch. These objections would be removed if it could be assured that the switch points were locked securely in place during such facing-point train movements. A locking device was previously developed which required hand operation to release the switch for a trailing movement, after which the train could proceed, because the switch returned to the locked position automatically after the train had passed. However, this arrangement obviously reduced the efficiency of a spring switch installation, and is, of course, not satisfactory at an end of double track where train stops are undesirable.

With these limitations in mind, an electric locking scheme for a spring switch was devised including a standard facing-point lock, such as is commonly used in interlocking, the lock being driven by a small machine consisting of a train of gears operated by a 10-volt d-c. motor. The facing-point lock includes a circuit controller attached directly to the plunger, thereby permitting the use of a circuit which makes the position of the signals governing train movements over the switch absolutely dependent upon the position of the plunger. The machine used for driving the plunger was manufactured by the General Railway Signal Company, and was originally designed for, and has been used extensively as, a skate-placing device in classification yards equipped with retarders. Previously a hand-throw lever had been added to the machine so that the lock plunger can be operated in case of a power failure. The advantage of using a 10-volt motor is that an ordinary signal battery can be used as a source of energy.

A spring-switch installation equipped with an electric locking arrangement, as just described, is in service on the Nickel Plate at the west end of double track at KM near Vermilion, Ohio. The spring switch stand is the Ramapo Style No. 100-A, 3-in-1, the springs and buffer being contained in the base of the stand. The rail is 110-lb. A.R.E.A. and the switch points are reinforced. The switch is equipped with the same type of tie plates and rail braces as is standard for an interlocked switch. Full signal protection is considered essential for a spring switch layout, and as this installation is on high-speed track, both home and approach signals are used.

The single track from the west extends on a tangent to form the eastbound track on the double track. Therefore, eastbound train movements are at normal speed but the westbound movements take the No. 18 turnout to single track with a 35-m.p.h. speed restriction through the turnout. The electric lock is, therefore, arranged so that the switch is locked for eastward or facing-point movements, but is unlocked for westward or trailing movements.

A circuit was developed to control the operation of the switch lock automatically by track circuits. However, on this installation the operation is controlled manually from GC office, four miles distant. No additional wires were required, as the lock control was carried on the same circuit that controls the signals. GC is a water station,

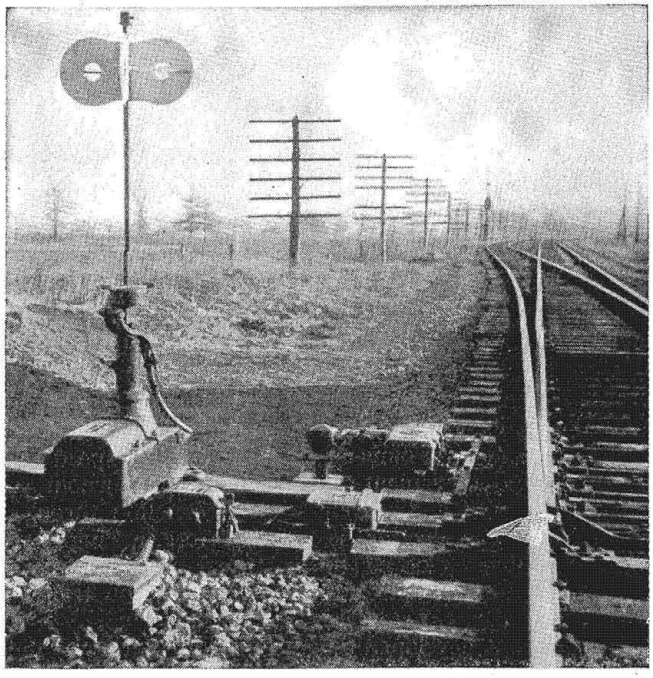


Track plan and circuit diagram for control of lock

the inside switches and signals at the lap siding being handled by a mechanical interlocking.

Previous to the installation of the spring switch a telegraph office had been maintained at KM, the end of double track. This office has been abandoned with the consequent saving of the wages of three operators. Trains are now handled between KM and GC on signal indications which supersede time-table superiority, and no train orders are required. For this reason the westward signal at KM had to be placed under the control of the operator at GC and the operation of the signal and the lock were made interdependent.

The westward approach signal at KM is normally in the caution position, and, in addition thereto, a roadside sign, placed 1,000 ft. from the switch, reads "Spring Switch—1,000 Feet—35 Miles Per Hour." The time table restricts movements through the turnout to 35 m.p.h., but the sign was placed with the idea of calling



The spring and buffer are housed in the stand

the enginemen's attention to the fact that they were approaching a spring switch.

The time-element relay shown on the plan serves a two-fold purpose. It provides approach locking in that it prevents the switch from locking after it has been unlocked for a westward movement; the relay also prevents the lock from operating, after the switch has been trailed through, until the switch points have returned to their normal position. A thermal cutout is provided to prevent the exhaustion of the batteries in case the lock should stick.

Our experience with this installation indicates that a spring switch with a facing-point electric lock can be installed in automatic signal territory for less than 25 per cent of the cost of remote control. Local conditions will, of course, determine the exact expenditure. The lock and circuit controller and their application were developed by the General Railway Signal Company in co-operation with and at the suggestion of the writer.

Special Rules

The following paragraphs are taken from instructions issued at the time the spring switch was placed in service and indicate in a general way the operation.

This switch is normally set for straight track with points under spring compression and locked in this position by a motor-driven plunger lock. This plunger lock, together with the signals at the east end of Vermilion and the westward signals at KM are under the control of the operator at GC. These are absolute signals governing between the east end of Vermilion and KM against opposing trains.

When it is desired to advance a westbound train from KM, the operator will place the signal lever to the left. This will cause the plunger lock to be withdrawn from the lock rod, after which the westward home signal will clear and the opposing signals will display "Stop." When it is desired to advance an east-bound train from Vermilion, the operator will place the signal lever to the right, which will permit the eastward signal at the east end of the westward siding to clear and set all the opposing signals at "Stop."

The normal or running position of the handle for the hand operation of the plunger lock is horizontal, extending at a right angle from the machine and it is secured in a retaining bracket with a switch lock.

To unlock the plunger lock, remove the switch lock from the bracket at the field side of the machine and raise the projecting handle to the vertical position, then push the handle down to the right and place it in the retaining bracket which is provided and lock the handle in this position with the switch lock.

Train Plunges Through Open Draw

THE derailment, on October 11, of a freight train on the Atlantic Coast Line at Buffalo Bluff, Fla., resulted in the death of one employee. The accident occurred at the south end of the draw span of Buffalo Bluff drawbridge over St. Johns river. A smashboard signal, mechanically operated by the bridge tender, is located 598 ft. south of the end of the trestle, off which the train plunged. A disk of red reflex buttons is attached to the arm of the smashboard. The interlocking and automatic approach signals involved are of the color-light type.

Northbound freight train Extra 1657, consisting of 25 loaded cars, six empties and a caboose, passed DeLand, the last open office, approximately 46.7 miles south of Buffalo Bluff drawbridge, at 1:54 a. m., passed signal 7048, which was displaying an approach indication, passed the home signal, which was displaying a Stop indication, and struck and broke the smashboard signal and then plunged off the bridge at the open draw while traveling at a speed which, it was estimated, had been reduced from about 40 or 45 m.p.h. to 25 m.p.h.

The report of the Bureau of Safety of the Interstate Commerce Commission states that the evidence is clear that the automatic and interlocking signals were displaying the proper indications when the train approached the open drawbridge and the statements of the fireman and the head brakeman were to the effect that the indications were clearly visible and that the engineman was cautious and had appeared up to that time to be in normal condition. In fact, the fireman said that the engineman spoke to him and told him to get off, this conversation having taken place when the engine was nearing the home signal. It is also to be noted that up to this time the only unusual condition noticed by either the fireman or the head breakman was the fact that the engineman did not begin braking at the customary point. The subsequent examination of the body of the engineman, however, indicated that he was dead when his engine went into the water, due to heart failure, and under these circumstances it is a question whether he was not so afflicted at the time his train was closely approaching the drawbridge.