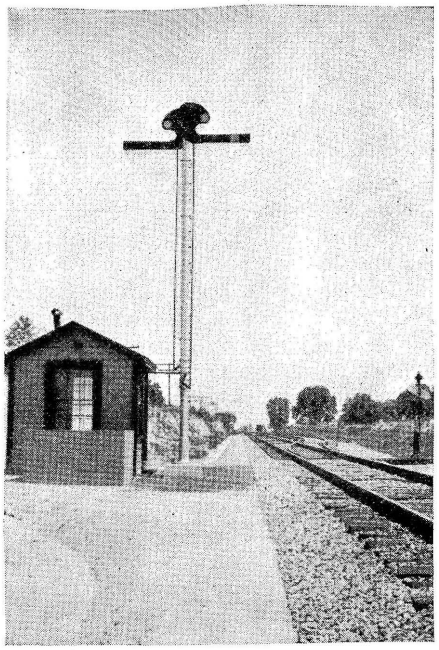
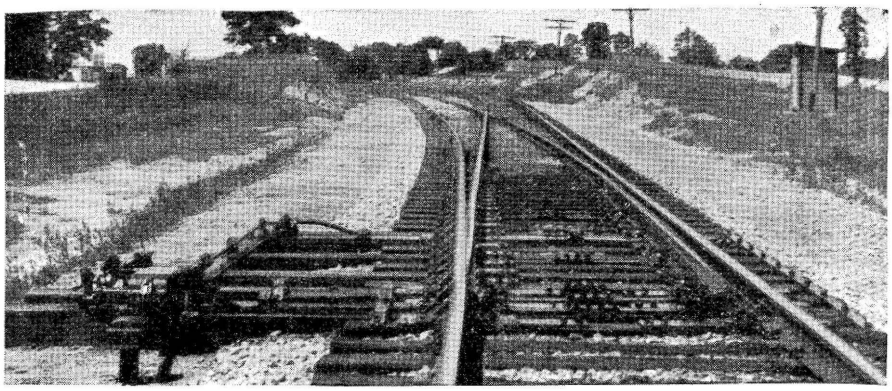


A new block office, complete with manually-operated signal, was located at the south end of each of the sidings



A spring switch was installed at the north end of each siding

Seaboard Utilizes

Installations at one end of each of 12 passing sidings on 106 miles of single-track line between Hamlet, N.C., and Columbia, S.C., expedite 12 train meets during 6 hours at night

As A means of reducing the train delays and the number of train stops when making meets on 106 miles of single-track line between Hamlet, N. C., and Columbia, S. C., the Seaboard Air Line has installed spring switches at the north end of 12 passing tracks and established manual block offices at the south ends of these sidings.

On the main route between Richmond, Va., and points in Florida, the Seaboard has one main line between Richmond and Hamlet, 254 miles, and one main route from Savannah, Ga., to Jacksonville, Fla., 139 miles, with various routes on south to Miami, Fla., and Tampa. On the section between Hamlet and Savannah, this road has two separate lines, one via Columbia, S. C., 247 miles long, over which the through passenger trains and some freight trains are operated, and a second line from Hamlet via Charleston, S. C., to Savannah, 263 miles long, over which the through freight trains are operated. When the signaling program was under way, automatic blocks were installed between Richmond and Hamlet, and between Savannah and Jacksonville, but signals were not installed on either of the lines between Hamlet and Savannah.

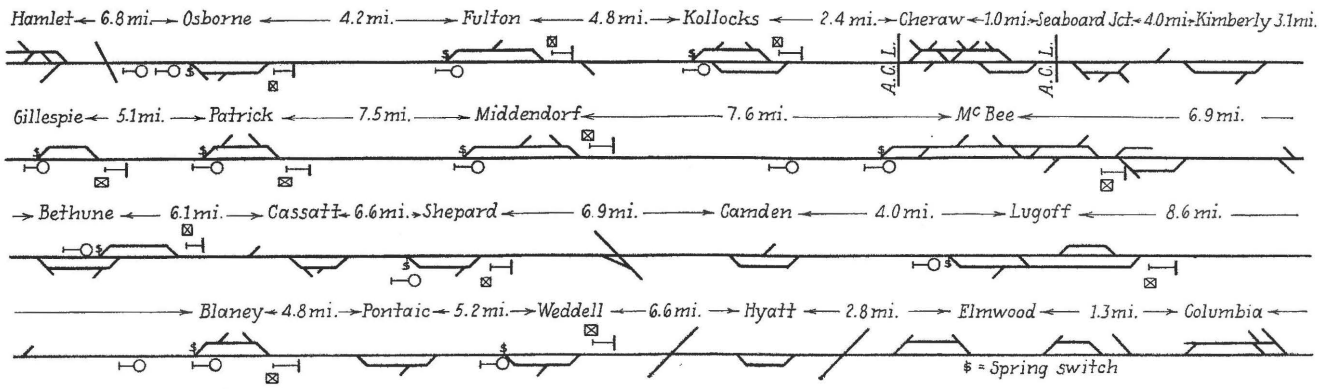
Trains Bunched at Night

As traffic increased, a special operating problem arose on the Hamlet to Columbia section because, in train time, this section is about half way between New York and points in Florida, with the result that the majority of the fast through passenger trains meet in this territory. During the winter season the schedule includes, in each direction, the Southern States Special, the New York-Florida Special, two sections of the Orange Blossom Special, a local passenger train and a freight train. In addition, during the fertilizer season, from February to April, a switching train is operated over the 27 miles between McBee, S. C., and Camden, 47 and 73 miles south of Hamlet, respectively. Thus the total daily scheduled traffic includes 10 passenger trains and 2 freights in addition to the switch train. Extra sections of the through passenger trains are operated at the peak of the season so that the total number of trains daily reaches a maximum of 18 to 20.

The real difficulty, however, in train operation was that all of the scheduled trains, with the exception of the southbound local passenger train, are operated over this 106.3 miles of single track, during the night, 13 trains being handled over the subdivision between 7:00 p.m. and 6:05 a.m. Furthermore, the trains are so bunched that the four through passenger trains in each direction are operated between 10:57 p.m. and 5:05 a.m., at which time the two through freight trains have about half of their runs to complete. The schedule calls for 12 meets between 10:05 p.m. and 3:12 a.m. During certain parts of this period of 5 hr. 7 min., a total of 10 trains are in operation on the subdivision.

Track Layout

The line between Hamlet and Columbia passes through a country of low hills, so that the line encounters numerous curves and short rolling or momentum grades, none of which affect the tonnage rating of the trains operated regularly. Passing tracks, each with a capacity of from 58 to 60 cars, are located at 17 places, and at Middendorf the siding was lengthened to hold 100 cars. During the summer months, when traffic is reduced, trains are operated by time table and train orders, but during the heavy traffic winter season from December 10 to April 25, movements are directed by absolute and permissive



Spring Switches

manual block, using absolute manual block in all moves involving a passenger train. As there are only two freights, this results in absolute block for practically all moves.

During the first and second tricks each day the traffic is light, the number of meets being so few that no serious delays are occasioned in having the trainmen handle the passing track switches. However, during the third trick, as explained previously, the meets were so numerous it was evident that the operation of trains could be improved decidedly if these delays could be reduced to a minimum. It was further evident that, if the block offices were located at one of the switches of a passing track rather than at the station, meet orders, effective at such a location, could be issued up to within a short time before the arrival of trains.

Therefore, it was decided that block offices should be established at the south end of certain passing tracks, and that during the third trick only, the operator should be on duty at this new office instead of at the station. With this arrangement, the operator would be at the proper location, not only to operate the manual-block signal and handle train orders, but also to throw the passing track switch to head trains into the passing track.

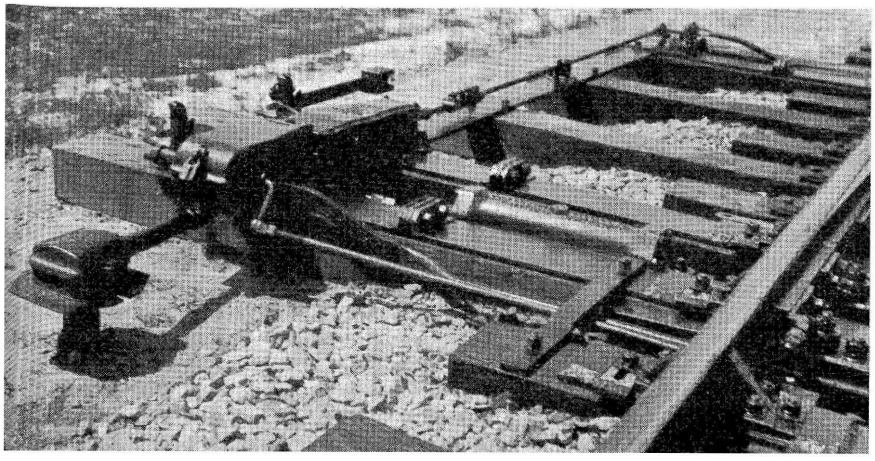
The next point for consideration was a means of operating the other switch of the passing track so most trains need not stop when leaving the siding. This was a logical application of a spring switch at the opposite end of these passing tracks and, in view of the fact that spring switches with facing-point locks had been in successful use on the Seaboard since 1931, it was decided that the use of such apparatus represented safe practice. As a result, the use of spring switches at one end of each siding, in combination with a block office at the other end, was approved.

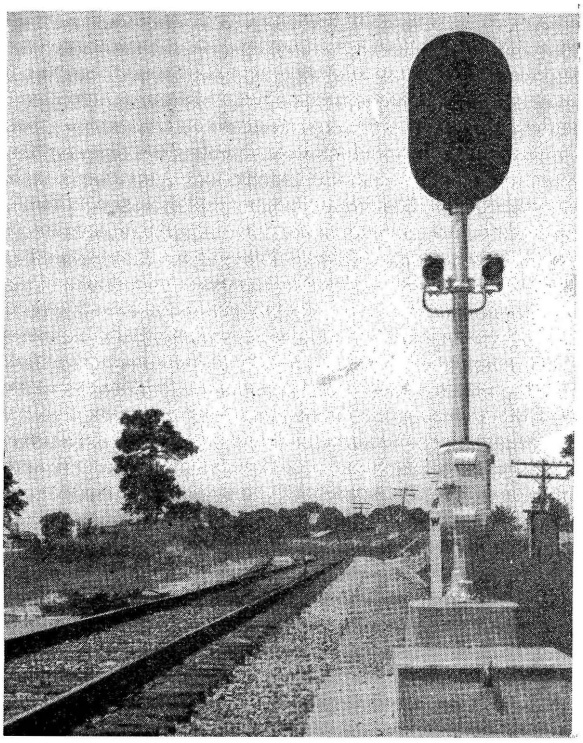
Location of Installations

In choosing the passing tracks to be equipped, the locations at which meets occurred most frequently were listed first, and then a station on each side was listed in order to provide flexibility in case trains were off schedule. Thus the spring-switch, block-office installations are located in groups of three, as is evident from the track diagram.

At the majority of the locations chosen, the grades on the passing

Below—The switch layouts were well equipped with plates and braces, a special feature being that the toe plates were welded to the gage plates. Right—Each switch position indicator signal has two lunar white markers.





tracks are favorable to a train headed northward. Therefore, it was decided, in order to have the layouts uniform, that in all cases the block office should be at the south switch and the spring switch at the north end. At the south switch of each of the 12 passing tracks, a small frame building was constructed to serve as an office, and a standard two-arm mechanical block signal was erected. In all instances the office is located on the side of the track opposite the switch stand so as to conform with Seaboard Air Line rule 104-B, which reads: "When a trainman changes a switch to let an engine or train into or out of a track, he will immediately cross over to the opposite side of the track from the switch stand. On double track he will take a position not less than 20 feet from the switch."

The No. 10 turnouts at the south end of each siding were left in service. At the north end of each of these passing tracks, the No. 10 turnout was replaced with a No. 16, so as to permit the trains to pull out at speeds up to 25 m.p.h. At these locations the entire switch layout was rebuilt, including the installation of the spring switch and locking arrangement. The stand, including the mechanical facing-point lock device, is the Union Switch & Signal Company's type S-2, and the spring and oil buffer unit, which is applied as a part of the throw rod, is the Pettibone Mulliken Company's style.

Sign and Signal Protection

Since the installation of these spring switches, the Seaboard has adopted the recommended standard sign A.A.R. 1613-A, which is a circular disk 15 in. in diameter, and bears the letters "SS" in black on white background. This sign will be attached to the signal mast immediately in advance of the spring switch or on a post adjacent to the spring switch. The installations described above, as well as all future installations of spring switches, will be equipped with this standard sign.

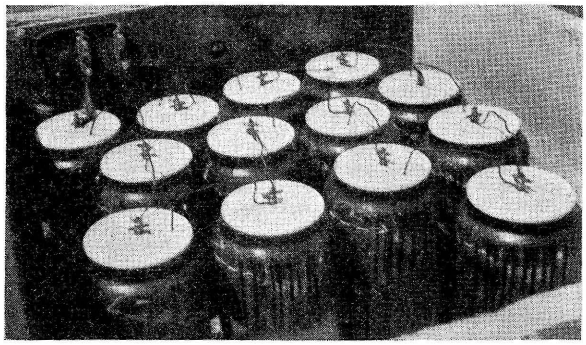
As no automatic block signals are in service on this subdivision, it was decided that the normally-closed position of the switch points and the lock plungers should be indicated by high signals. Therefore, a regular color-light type signal was installed at the right of the track in the approach to the facing-points, the signal being approximately a half rail length from each switch.

Although the head is the same as a regular signal, these signals are in reality switch-position indicators. The control circuits for each signal check the normally-closed position of the switch within ¼ in., and not only check that the lock plunger is in proper position, but also check over- or under-throw of the plunger so as to maintain a check on the correct operation for trailing moves through the switch. As long as the conditions are correct, the control is set up for the signal to display a green aspect. If the switch points or the lock plunger are not in the proper position, the green light is extinguished and the red aspect is displayed in the main unit, and, in addition, two bracket lights, one on each side of the mast, are illuminated to show lunar white, thus completing the "stop" aspect for a spring switch signal. On encountering such an aspect, a train is stopped short of the indicator and an inspection is made of the switch.

At all but three of the layouts the track is practically tangent on the approach to the switches so that an engineman can see the aspect for a distance more than braking distance away. At three locations, however, curves in the track prevent proper sighting distance. Therefore, at each of these three layouts, a distant signal of the color-light signal type was installed. These distant signals are located from 2,379 ft. to 3,600 ft. in approach to their respective home signals. When a home switch-position signal displays green, its respective distant also displays green, but when the home displays red, the distant displays yellow. All of the signals are controlled for approach lighting so that they are not illuminated except when a train occupies the track circuits in approach thereto. They do not check block occupancy ahead.

In addition to affording information to an engineman of a southbound train to the effect that the switch is in proper position and locked for a main line through movement over the switch in the facing-point direction, the signals are also observed by trainmen on northbound trains, so that any improper condition of a spring switch can be detected and corrected as soon as possible. For example, after a northbound train pulls out of a passing track on to the main line, the conductor or a trainman must look to see that the home switch signal displays the green aspect, thus checking the fact that the switch has closed and been locked. If the green aspect does not appear, the fact is reported at the next open office.

Thus these signals perform a function similar to that of switch targets and lamps, except that the check as to the position of the switch is much more accurate with the signals than with a target operated by the ordinary stand. All of these facts are explained in the instructions to trainmen, with warnings that these signals are controlled only by the position of the switches and are not to be accepted in any way as a manual block or as an automatic signal controlled by track circuits and indicating block occupancy ahead. The switch-position signals and control equipment were furnished by the Union Switch & Signal Company, and are operated from primary battery provided by Thomas A. Edison, Inc.



Each signal is operated by a set of 1,000-a.h. primary batteries

Method of Train Operation

During the first and second tricks each day the operators are on duty at the regular stations, and, for the few trains operated, the trainmen operate the switch stands by hand when using the passing tracks except that northbound trains can, of course, pull out of the sidings through the spring switches without stopping. During the third trick the operator is on duty, not at the station, but at the new block offices at the south switch of each of the respective 12 locations. The tour of duty at the new offices varies somewhat from the regular third trick hours, 10 p.m. to 6 a.m., certain differences being made to adapt the hours to meet the time of maximum train movements. At one location the operators are on duty

from 4 p.m. to 8 a.m., but in the majority of instances the new offices are in service from 8:30 p.m. until 4:30 a.m.

Open Block Offices

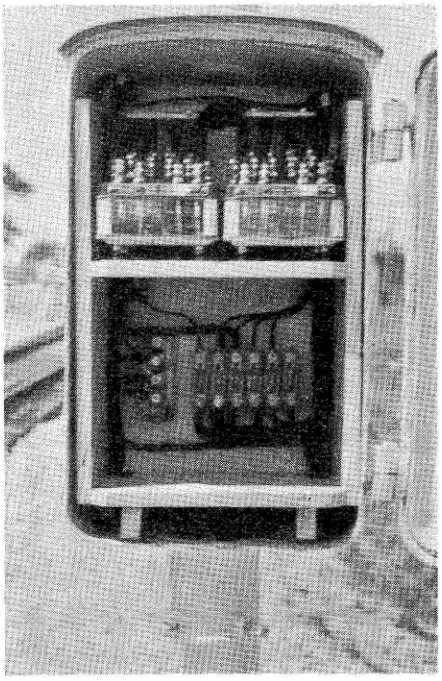
In addition to the open block offices at these 12 locations, offices are open continuously at two other intermediate points, Seaboard Junction and Camden, and counting the offices at the two terminals, Hamlet and Columbia, there is a total of 16 continuously open offices on the subdivision. Telephone train dispatching equipment is in service for issuing train orders and for the interchange of information as to the location of trains. Booths with telephones connected to the dispatcher's line are located at 21 places where they can be used by train crews.

It is the rule that the meets are to be established ahead of time by train order. The instructions and rules set forth that a northbound train holding an order to take siding is to approach the block office under control, and the engineman is to call for the signal (S.A.L. Rule 14-J) and will stop unless the switch is reversed, the track is clear into the siding, and he receives a proceed hand-signal from the operator (S.A.L. Rule 12-C). The train speed through the No. 10 turnout is limited to 10 m.p.h. In the meantime, the operator, holding a copy of a meeting or passing-point middle-order, when an engineman of a northbound train calls for a signal, will throw the switch for the siding by means of the hand-throw stand, see that the switch points fit properly, cross to the opposite side of the track and give the engineman the proper proceed hand-signal (S.A.L. Rule 12-C). When the train is in the clear on the passing track, the operator places the switch in the normal position. After the southbound train to be met has passed, the northbound train on the siding can pull out through the spring switch at the north end without stopping, this move over the No. 16 turnout and trailing through the spring switch being limited to 25 m.p.h.

Non-Stop Meets Are Made

With this method of operation, including no train stops to operate hand-throw switches, a meet can be handled in a very short time. Furthermore, in view of the fact that a train can depart from, as well as enter, a siding without stopping, it is possible to advance a train from one siding to another on short time. Close meets can be made with safety because the block office and signal, with a man on duty, are located at a strategic point for the operation.

The fact that the sidings are long enough to hold a train of 60 cars facilitates the execution of non-stop meets for passenger trains. On February 8, two of the Orange Blossom Specials, No. 308 northbound and No. 7 southbound, met at McBee without either train stopping. On February 28, No. 108 northbound met No. 107 at Blaney and No. 7 at Bethune, no train stop being made. On April 12, No. 108 met No. 107 at Weddell, No. 7 at Bethune, and No. 307 at Kollocks, none of these trains stopping at the meeting points. Again on April 15, No. 108 met No. 107, No. 7 and No. 307, with only a two-minute stop for No. 108 at Fulton.



The instruments are located in a case mounted on the mast

Numerous other examples of non-stop meets or close meets, in which one of the trains stopped only two or three minutes, are readily apparent from a study of the train sheets.

Switch Layouts Well Constructed

At the north ends of the 12 passing tracks where the new No. 16 turnouts were installed, the entire switch layouts were built new so as to insure proper operation of the spring switch and lock equipment. The rail is 100 lb., and the switch points are 30 ft. long with 1¼-in. re-inforcing instead of the usual ⅜-in., and the bars are riveted to the points. New sawed cypress ties were installed throughout the length of the turnout.

Cut gage plates of open-hearth steel, ¾ in. thick, 7 in. wide and 3 ft. long are used on the first two ties under the points and also on the tie ahead of the points. Nine ¾-in. bolts extend through each plate and the tie. On the three first ties Racor adjustable rail braces are used, and on the tie ahead of the points additional braces were placed on the gage side of the rails to prevent rolling of the rails. An insulated gage plate, together with adjustable rail braces, was placed on the eighth tie, the plate being extended and bolted to the base of the crank used in the connection for operating the lock plunger. On the first two ties under the point, plates bolted to the end of the gage plates extend and are attached to the base of the switch mechanism. A plate ¾ in. thick, 6 in. wide and 11 ft. long extends from the end of the mechanism to the crank base. This plate also serves to prevent shifting of the ties, and on the opposite end of the ties a strap ¾ in. by 2½ in. is bolted to the 10 ties in the layout. With this arrangement of plates and adjustable braces, the relative position of the various parts can be established and maintained properly, a matter which is highly essential to the proper performance of such a layout.

Signal Controls

The color-light distant and home spring switch signals are either of the Union Switch & Signal Company's R2 or P5 type, with 10-volt, 18-watt lamps, the home signals having two lunar white markers mounted below the color-light unit. The markers are illuminated when the red aspect is displayed on the top unit, indicating that the switch is set to the siding, that the switch points are not properly fitted against the stock rail, or that the switch is not locked. The H relay controls break through contacts on the point detector of the S-2 facing-point lock and through contacts operated by the lock plunger, both for over-throw and under-throw. Connections from the parkway outlet to the point detector are carried through a 16-in. piece of air hose. Where a distant signal is installed, the control wires are carried on the pole line, connections between the pole line and the instrument case being in parkway cable. Everett multipath type-W lightning arrestors were provided, and all parkway cables entering the instrument cases were pot-headed at a point where they would not come in contact with any metal. Union DN-11 line relays of 1,000-ohm resistance were used in the signal controls, power being supplied from 13 Edison HA-1,000 cells.

Approach lighting circuits extend approximately 4,000 ft. in the approach to each signal, the approach track circuit block joints being opposite the home or distant signal involved. These track circuits are double-rail neutral d-c. track circuits, using Union 2-ohm track relays and two Edison M-1,000 primary cells in multiple for each track circuit. The track leads are single-conductor No. 9 solid copper parkway cable, with Raco bootleg outlets. A. S. & W. stranded bonds of the S-1 type were used in bonding the rail.

The gravel, sand and cement for the foundations was distributed by a work train. Metal forms were used throughout, and the concrete was mixed by hand. The spring switches were installed by the signal forces of the Seaboard Air Line, using two gangs.

The first gang, consisting of a foreman and four men, went through first mixing concrete, stringing all the necessary line wire on the existing pole line and bonding the rail. Later this gang, combined with another consisting of a foreman and eight men, installed the spring switches complete with plates and braces. A camp train was used, all the necessary material for all 12 installations being carried through on the train, rather than having the material shipped to each individual point. With this method of organization, a complete spring switch installation was made every 1½ days.

New Flamenol Cable

A NEW synthetic insulating compound has been recently introduced commercially by the General Electric Company under the trade name of "Flamenol." While similar to rubber in its characteristics, it contains no rubber and will not support combustion.

Termed the most radical cable development in the last 25 years, Flamenol is entirely different from any insulation previously available. In addition to being non-combustible, it is highly resistant to moisture, acids, alkalies and oils. It has excellent aging characteristics and is strong mechanically.

Flamenol-insulated cable is recommended for power and control circuits at 600 volts and less, and for operation at a maximum copper temperature of 60 deg. C. It is well adapted to switchboard wiring and battery and coil leads. Flamenol has a permanently smooth finish and foreign materials do not readily adhere to its surface. It is available in a variety of colors for circuit tracing. For most applications Flamenol is used without any protective finish, such as braid, lead or armor. It is only where the cable will be subjected to extreme mechanical abuses that such a finish is necessary.

J. C. Mock Retires

JAMES CURTIN MOCK, whose retirement on June 1 as signal electrical engineer of the Michigan Central was announced in the June issue of *Railway Signaling*, was born June 1, 1866, at Kylertown, Pa. He attended public school until 1882 and Claire Academy until 1883. Upon the completion of a four year course in mechanical engineering at Pennsylvania State College in 1890, Mr. Mock entered the service of the Union Switch & Signal Company as construction foreman and designer. Six months later he was notified to report in New York, where the installation of the electro-pneumatic interlocking plant at Jersey City Terminal, for the Pennsylvania, had just begun. This was the second terminal of any size to be installed with power interlocking, and the first of the electro-pneumatic type.

J. C. Mock

After the completion of the Jersey City interlocking, Mr. Mock was employed on the Broad Street Terminal at Philadelphia, the Coleman lock and block signaling on the New York Central, and on the installation of improved devices on the electro-pneumatic interlocking and block signaling on the Harlem division of the New York Central. This, with work on the North Station, Boston, and on automatic block signals on the Michigan Central, the Delaware, Lackawanna & Western, and the Central Railroad of New Jersey, rounded out a 10-year period with the Union Switch & Signal Company. The intervening time from the end of one construction job until the beginning of the next was spent at Swissvale on estimates, circuits, revising and improving designs and bringing out new designs.

On July 10, 1901, Mr. Mock was appointed signal engineer of the Michigan Central. Not many signalmen realize that the Michigan Central was one of the few roads in America that had a signal engineer 36 years ago, and Mr. Mock states that at the time he took that position he believes the Michigan Central had more automatic block signals and more interlocked crossings than any other road, with the possible exception of the Pennsylvania.

In 1906 Mr. Mock was appointed electrical engineer of the Detroit River Tunnel Company, and here encountered an entirely new set of difficulties to be surmounted. His versatility is illustrated by the way he turned from signal engineering to electrical engineering and by his grasp of operating conditions on this work. The power installation for the tunnel has provision for almost any conceivable failure or emergency. After the completion of the tunnel construction in 1912, he was reappointed signal engineer, while still retaining the duties of electrical engineer.

Mr. Mock was chairman of the New York Central System Signal and Train Control Committee from 1905 to date. He was also active in association work, having been president of the Signal Club in 1906 and president of the Railway Signal Association in 1907. Mr. Mock is past chairman of Committees VI and X of the Signal Section, A.A.R., and is a present member of these committees.