be given when the rear end of a preceding train has advanced a predetermined distance into the block, which in this case is at the signal south of Tantallon switch. Under no circumstances can a clear signal be displayed for following movements when the block is occupied by a train, nor can the entrance signals be unlocked for a movement head-on against a train which has entered the block.

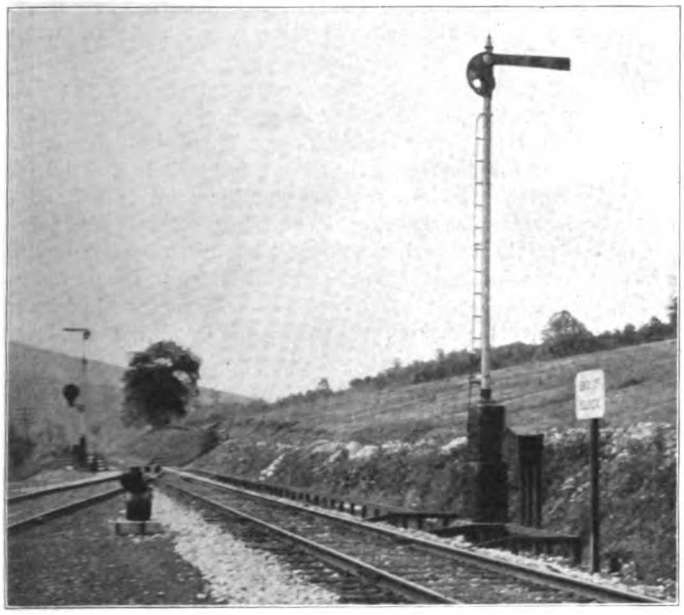

Fig. 5. High and Low Three-Position Signals and "Take-Siding" Signal at Sherwood. (Signal D-2, Fig. 1.)

Before the signalman at Rockledge can release the signal at either Cowan or Sherwood, he is compelled to set the passing track switch for the passing track, which, when set, is automatically locked in that position, and it cannot again be set for main track, except through a clear block being given the signalman at Rockledge by either the signalman at Cowan or Sherwood, either of which will release the switch automatically, so that it can be set for the main track. This switch is also equipped with an automatic time release which requires the presence of a train within 3,000 ft. of and either north or south of the switch, and a certain time interval before the switch can be released. This time interval can be made anything from a few seconds up to four minutes. It will be used principally to release the switch when two or more trains are occupying the main track at Rockledge, at one time, and which, obviously, prevents clear signals from releasing the switch. The necessity for this time release is, therefore, apparent.

Fig. 6. Sherwood Tower, and Signals at the South End of the Passing Track.

Signalmen receive indications from all signals they cannot see and of the entrance of trains into the opposite end of block for which they have released the signal. Telephone communication has been established for handling trains, and no train orders will be used, and classification and time table superiority has been abolished.

In the 14 days prior to the taking effect of the new block system, the dispatchers gave 1846 orders; for the 14 days after its taking effect, they gave 1231 orders; therefore, this system has saved 44 orders per day, or a reduction of 34 per cent in the work of the dispatchers and a corresponding reduction of the risks which are obvious under the train order system.

All the circuits and the block instruments were designed and patented by George S. Pflasterer, signal engineer for the Nashville, Chattanooga & St. Louis, and all apparatus was installed under his direction. Mr. Pflasterer has been experimenting with this system for the last two years and has a fully equipped experimental plant at the company shops at Nashville, Tenn. The block instruments are very efficient in operation and flexible in their adaptability. While the signals controlled by the instruments in this layout are all power signals, mechanically-operated signals can be controlled by them as well, and they are arranged so that the simplest as well as the most complicated situation can be controlled by them.

Where hand-operated switches are controlled by signals, the top signal will be a semaphore for main-track movements and the bottom signal will be a disc or banjo signal. This banjo signal will normally show a red disc for day and a red light for night stop indication, and, when cleared, the day indication will be a large letter "S" in white, and the night indication will be an illuminated letter "S," which means, "Take Siding." The instruments and all other apparatus used were manufactured by the Union Switch & Signal Co. Mr. Pflasterer has also another patent, just lately issued, for improvements and additions to this system, when mechanically-operated signals are used.

Batteries of the Gordon type are used for the block instrument circuits and all power signals, and Columbia track batteries for the track circuits. No 12 Copper Clad insulated line wire is used for all line circuits, and "Kerite" rubber-covered wire is used in tower and trunking.

Fig. 1 shows the track diagram for the entire stretch. Fig. 2 shows block instruments and automatic time release in the Rockledge tower. Fig. 3 shows the block instruments and indicators in the Sherwood tower. Fig. 4 shows a battery shelter for Columbia track batteries. Fig. 5 shows high and low three-position signals and "take siding" signal in the background. Fig. 6 shows two arm interlocked signals at Sherwood, at the south end of the installation.

THE SIGNAL DEPARTMENT of the Norfolk & Western uses 70 light inspection motor cars in the maintenance of its automatic signals. The estimated saving in labor resulting from their employment has been 25 per cent, and the increase in efficiency has been 50 per cent. In the painting of track signs and signals motor cars have reduced the cost of the work 50 per cent. D. W. Richards, signal engineer of the road, says regarding the use of these cars in signal work: "Our supervisors and signal inspectors have reduced the cost of maintenance to a minimum. We have had several cases where excessive speed (30 to 35 miles per hour) was the cause of serious accidents to men in charge. There is no doubt of the advantage of having motor cars for maintenance purposes aside from the saving in labor. Many applications for positions have been received in which the question was asked as to the use of motor cars, and where they are used there have been few resignations of good men in comparison with the number of men employed."