

question, and where yet the reasonable requirements of safety demand the use of the space interval. And temporary conditions frequently arise, even on large roads, where the staff system is the best arrangement. It is to be remembered, too, that the staff system—absolute, not permissive—is the only space interval system under which everybody feels free to suspend the flagging rule. The retention of the flagging rule is the most archaic feature of our boasted modern efficiency.

New York.

R. DIEFENDORF.

REPRESENTATIVE SECTIONAL MEETINGS

To the Editor:

I have read with interest your editorial on page 230 of the *Railway Signal Engineer* for June on the New York Sectional Committee Meeting. The attendance was very good, but if consideration is given to the field to draw from, the attendance at the meeting held in St. Paul on March 20, 1920, was much better. There were 3 signal engineers, 2 assistant signal engineers, 18 signal supervisors and assistant signal supervisors, and 47 signal department employees below that grade. In addition, there were 10 other railway employees present, including a general superintendent, assistant general superintendent, 2 assistant mechanical superintendents, 1 engineer of tests, 1 supervisor of telegraph, 1 general foreman telegraph and 3 other telegraph department men, as there

were subjects under discussion of vital interest to them. There were only 10 representatives of manufacturers and others, as against New York's array of 56.

Meetings in this section are held all day instead of in the evening, as the officers of the Northwest realize the good that it is possible to accomplish through them, and care has been taken to bring the meetings to the attention of other department heads when subjects of interest to them are to be presented.

So much interest has been aroused through the strenuous efforts of Chairman E. J. Relph through his success in securing well-informed and interesting speakers, and his encouragement of questioning and discussion, that in the future other roads adjacent to St. Paul expect to have their employees attend in as large proportion as those from the Northern Pacific, and if so, the New York Meeting on which your editorial was based will be far eclipsed as a representative body of its section.

In addition to the men attending the meeting, a new field for thought and activity has presented itself through the request for copies of the minutes containing discussions of real interest to them from those unable to attend, notably from some of the division superintendents of this section.

St. Paul, Minn.

I. SEELY JONES,

Electrical Engineer of Signals, Northern Pacific.

Non-Automatic Blocks and Accident Records

A Study of a Five-Year Record of Collisions Points to Bad Practices Which the Railroads Are Called Upon to Correct

By W. P. BORLAND,

Chief, Bureau of Safety, Interstate Commerce Commission

AN editorial entitled "Block Signal Statistics" in the *Railway Signal Engineer* for July, commenting upon the annual table of block signal statistics recently published by the Interstate Commerce Commission, says that "it would not seem out of place to include with these statistics information pertaining to what practices are good, what are bad, and how, where and to what extent good practices are replacing the bad. The numerous collisions that have occurred in block signal territory indicate the need of such a study and review."

To some extent the desired information is already available. In one table in the statistical bulletin referred to, the practices employed in the operation of the non-automatic block system are classified, particularly with reference to permissive blocking. The report shows that the non-automatic block system was in use on 63,915 miles of road January 1, 1920; that on 4,235 miles of road permissive signaling was forbidden by the rules, for all trains, various methods being employed for authorizing permissive movements in the remainder of non-automatic block territory. The tables indicate that permissive signaling is allowed on 59,680 miles of road operated by the non-automatic block system; but on approximately 36,890 miles is not permitted for movements involving passenger trains.

The American Railway Association defines "block system" as "a series of consecutive blocks;" according to the Signal Dictionary it is "the method of regulating the movement of railway trains, so as to maintain an interval of space between trains moving in the same direction (on the same track)." In the Commission's orders calling for annual block signal statistical reports the term

"block system" is defined as any method of maintaining an interval of space between trains, as distinguished from the time-interval system.

From an operating standpoint the practice of permissive blocking cannot be condemned wholesale; but when the practice is followed indiscriminately and without proper safeguards, the block system itself is virtually nullified. As suggested in the editorial referred to, railroad officers themselves, in compiling their reports, are sometimes in doubt whether the methods and practices followed on their lines in the operation of trains constitute the block system; and each year, in the compilation of these statistics inquiries are necessary in some cases to determine whether as a matter of fact the block system in any form is used, or whether the method of operation reported as the block system has been modified by rules, bulletins and operating practices to such an extent that the reporting carrier cannot properly be credited with having the block system in use on its lines. And in accident investigations conducted by the Bureau of Safety it is necessary to devote considerable attention to rules and practices found to be in effect under the non-automatic block system. In certain cases these investigations have disclosed the existence of unsafe rules and authorized methods of operation which, to say the least, are questionable; as well as the prevalence of practices contrary to the rules which have grown up in service; and also flagrant disregard of block signal rules.

The suggestion is timely that attention be centered upon the quality of the block system employed by each carrier on its line. But this should be done in the first instance by the carriers themselves, not only for the purpose

NOTES ON CERTAIN COLLISIONS OCCURRING IN NON-AUTOMATIC TERRITORY, INVESTIGATED SINCE JANUARY 1, 1915

Explanation of heading: C., Kind of accident, Rear collision (rc), Butting collision (bc) or Crossing collision (xc). K.T., Kind of train, Freight (F) or Passenger (P). K., Killed. I., Injured. T., Number of main tracks.

Date 1915	Road	Place	C.	K.T.	K.	I.	T.	Causes
Feb. 2	Pennsylvania	Irving, N. Y.	rc	F&F	1	6	1	Failure of conductor and flagman properly to protect train; failure of engineman properly to control speed after exploding torpedoes when running on permissive signal indication.
Mar. 5	Wabash	Garber, Ill.	bc	F&Work	1	10	1	Failure of crew of extra and of dispatcher to keep train clear of main track on time of superior train; extra running against opposing superior train without proper protection; wires being down, dispatcher instructed crew to run carefully prepared to stop if any opposing trains appeared.
Jan. 27	C., R. I. & P.	Platte River, Mo.	bc	F&F	4	1	1	Failure of conductor and engineman to keep their trains clear of main track on time of superior train; failure of two operators to comply with manual block rules.
July 29	C., R. I. & P.	Mickles, Ark.	rc	P&F	2	6	1	Failure of conductor to know that freight train was properly protected; crew of passenger train had received block-restriction card advising them of time two freight trains entered block.
Aug. 1	C., R. I. & P.	Waveland, Ark.	bc	F&F	..	8	1	Failure of crew to obey a wait order; failure of crew of other train to clear superior train 5 minutes; both trains in block under clear signal.
Aug. 12	B. & O. S. W.	Orient, Ohio	rc	P&F	6	125	1	Failure of engineman of freight train to have train under control while following passenger train in block; failure of conductor and flagman of passenger train properly to protect same.
Sep. 24	Missouri Pac.	Plattsmouth, Neb.	bc	P&F	3	25	1	Failure of crew of passenger train to obey meet order at station within limits of block section.
Oct. 19	Kansas City Sou.	Kansas City, Mo.	bc	2 Locos	3	3	1	Engine allowed to enter occupied block, due to error of dispatcher or of operator.
Nov. 2	Ches. & Ohio	Keswick, Va.	rc	F&F	3	..	1	Failure of crew to run in occupied block as required by caution card, and their failure to observe time-card speed-limit rule when engine was moving backward.
Nov. 26	Wabash	Morris, Ind.	rc	F&F	2	2	1	Failure of engineman properly to control speed while running in occupied block under a caution card.
Dec. 24	T., St. L. & W.	Veedersburg, Ind.	bc	P&F	4	21	1	Failure of operator to copy train order correctly; operator gave passenger train caution card, stating that block was clear, without first communicating with operator at other end of block.
1916								
Feb. 15	Seaboard A. L.	Franklinton, N. C.	rc	P&F	1	35	1	Failure of conductor and engineman to keep engine clear of main track on time of superior train; failure of brakeman properly to deliver to engineman instructions entrusted to him by conductor.
Mar. 4	C., St. P., M. & O.	Mtn. Lake, Minn.	rc	F&F	4	3	1	Failure of engineman to have train under control approaching station, running on caution card.
June 15	Hocking Valley	Fostoria, Ohio	xc	Ex&F	1	..	1	Failure of engineman to have train under control a sufficient distance from crossing of another railroad to prevent his train from striking train occupying crossing.
July 21	Norfolk & W.	Belspring, Va.	rc	F&F	2	5	1	Failure of engineman to have train under control; failure of conductor and flagman to protect by flag; error of operator in issuing clearance card indicating block to be clear.
Aug. 9	Southern	Crowell, S. C.	bc	P&F	1	4	1	Failure of trainmaster, acting as engineman, to have freight train under control approaching meeting point.
Aug. 15	Balt. & O.	Washington, Pa.	bc	F&F	3	8	1	Failure of crew to obey train order fixing meeting point within limits of block section.
Oct. 15	Chi., Bur. & Q.	Smithfield, Neb.	rc	F&F	11	14	1	Failure to protect by flag; following train received caution card upon entering block 72 miles in length.
1917								
June 13	N. Y., N. H. & H.	Westfield, Mass.	rc	F&F	1	3	1	Failure of engineman properly to control speed of his train within yard limits; was running on caution card.
June 13	A., T. & S. F.	Flynn, Okla.	bc	P&F	2	72	1	Failure of crew of passenger train to obey meet order at point within block section.
June 30	Seaboard A. L.	Kittrell, N. C.	bc	F&F	4	2	1	Failure of operator to display stop signal and deliver train order changing meeting point.
July 16	L. & Nash	Nashville, Tenn.	rc	F&F	1	..	2	Failure of flagman properly to protect train; failure of conductor to see that train was properly protected; question as to whether caution block signal indication was displayed.
Aug. 1	Norfolk & W.	Rippon, W. Va.	bc	F&F	2	41	1	Failure of engineman to obey meet order; error on part of operator in changing block signal from stop to clear position.
Aug. 8	N. Y. Central	Geneva, N. Y.	xc	2 Locos	1	1	1	Failure of engine crew to obey signal indication; fixed signal so arranged as to make hand signals frequently necessary.
Aug. 16	M., Kan. & Tex.	Watauga, Tex.	bc	P&F	2	12	1	Failure of crew to provide proper protection when occupying main track on time of superior train; failure of passenger engineman to operate train under proper control when running on caution card.
Aug. 23	C., C., C. & St. L.	Mansfield, Ill.	rc	P&F	1	24	1	Failure of engineman to stop train at crossing as required by special order and his failure to observe and obey stop signals given by flagman due to being asleep; block system not used at night.
Sep. 1	Great Northern	Havre, Mont.	bc	F&F	2	4	1	Dispatcher permitted train to enter block already occupied by another train; staff system.
Dec. 12	Col. & Southern	S. Denver, Colo.	rc	P&YdEn	..	20	1	Switch engine occupied main track without authority or proper protection; failure of engineman of passenger train to obey rules regulating speed within city limits.
Dec. 14	Southern	Calhoun, S. C.	bc	P&P	2	18	1	Failure of operator to deliver copy of right of track order; failure of dispatcher to have operator make sufficient copies of order and obtain conductor's signature; misunderstanding between block operators.
Dec. 19	C., R. I. & P.	Amity, Mo.	rc	F&F	2	1	1	Failure of conductor properly to protect rear of train; failure of conductor to make sure it was properly protected; operator allowed train to enter occupied block without caution card.
1918								
Jan. 30	Norfolk & W.	Dublin, Va.	bc	F&F	4	4	1	Failure of conductor properly to check train register; error in issuing clearance card to extra train, permitting it to occupy block without notifying operator at next block.
Apr. 10	N. Y., N. H. & H.	Pomfret, Conn.	rc	F&F	4	3	2	Failure of crew to operate train under control after receiving caution card stating that block was not clear; block 24 miles in length.
Apr. 25	C., B. & Q.	Bayard, Neb.	rc	F&Wk	6	2	1	Failure of flagman of work train properly to protect; failure of engineman of freight train to have train under sufficient control, to obey stop indication of train-order board.
Aug. 4	Balt. & Ohio	Bridgeville, Ohio	bc	F&F	1	1	1	Error of operator in copying train order and improper acceptance of order by conductor and engineman; meet order did not include words, "Take Siding."
Sep. 10	C., B. & Q.	Birdsell, Neb.	rc	P&Wk	11	4	1	Work train occupying main track on time of superior train; passenger train not running under control in occupied block.
Oct. 4	Erie	Red House, N. Y.	rc	F&F	2	2	2	Failure of engineman to operate train under control after passing signal in caution position.
Nov. 23	Pennsylvania	Dewart, Pa.	bc	F&F	6	5	2	Failure of operator to deliver train order.
1919								
Jan. 11	Balt. & Ohio	Maynard, Ohio	bc	F&F	1	8	1	Failure to obey a wait order; block card as received by engineman was not legible and he did not have copy of meet order; conductor forgot order.
Feb. 26	Gr. Rap. & Ind.	Cadillac, Mich.	bc	P&F	2	23	1	Failure of engineman to observe and obey stop signals given by flagman; block system applies to following movements only.
Mar. 1	N. Y., N. H. & H.	Touisset, R. I.	bc	P&Wk	1	34	1	Failure of flagman of work extra to obey instructions to hold all trains; block system applies to following movements only.
Mar. 6	Pennsylvania	Heaton, Pa.	rc	F&F	4	2	2	Failure of engineman to operate train in occupied block under proper control; failure of flagman properly to protect his train.
Sep. 1	Del. & Hudson	Carbondale, Pa.	rc	F&2 Eng	1	..	2	Failure of leading engineman to operate engine under proper control rounding sharp curve in occupied block.
Dec. 22	Wabash	Huntsville, Mo.	rc	P&F	1	15	1	Freight train occupying main track on time of superior train without proper flag protection; failure of engineman of passenger train to operate train under proper control in an occupied block.

of determining what practices are good and what bad, but also for the purpose of supplanting undesirable by safe and efficient practices. That dangerous conditions and practices exist under the non-automatic block system has too often been demonstrated by the occurrence of disastrous collisions. It should not be difficult for responsible supervising and operating railroad officers to ascertain accurately the practices followed on their lines, and promptly to correct dangerous conditions or practices which investigation may disclose.

A large volume of illuminating information bearing on this subject is already available in the form of accident investigation reports which are made public by the Commission from time to time and published in condensed form in the quarterly accident bulletins and summaries. The accompanying tabulation sets forth instructive facts with reference to certain collisions occurring in non-automatic block territory which have been investigated by the Bureau of Safety. Since this work was begun in 1911 the Commission has investigated about 60 collisions of this class. The reports concerning cases which happened since January 1, 1915—five years—are abstracted in the table. The column headed "cause" affords an indication of the circumstances and practices which led to these accidents.

Some of the more recent accidents of this character may be referred to somewhat more in detail as follows:

1.¹—Rear collision of freight trains; caused by failure of engineman to operate his train under proper control while running on a caution card. The following train entered the block section, which was 24.5 miles in length, 1 hour and 5 minutes behind the first train, with a caution card stating that the block was not clear. The only definite information conveyed to the engineman of the following train by this caution card was that at that particular time there was a train ahead within a distance of the length of the block, 24.5 miles.

2.²—Rear collision of freight trains; caused primarily by failure of engineman to operate his train under proper control within yard limits. Under a manual block rule, when a preceding train has been reported as inside the outer switches of certain stations named in the time-table a clear signal may be given to any following train except a passenger train; a passenger train entering the block under such circumstances is required to have a permissive card, form C, which reads, "Proceed, expecting to find a train in the block between this station and _____." Under this rule a train may receive a clear signal indication or a clearance card stating that the block is clear when, as a matter of fact, at certain stations the block may be clear only as far as the outer switch, with a train occupying the main line inside of the outer switch, still within the limits of the block section for which a clear indication has been given; furthermore, under the rules in effect the question of whether the block is considered clear or occupied depends on the classification of the train which is about to enter the block.

3.³—Rear collision between a freight and a passenger train; caused by the freight train not being properly protected by flag and by the passenger train not being operated under proper control when running on a caution card. The freight train had entered the block running on a caution card, and near the leaving end of the block was flagged by a preceding freight train. In the meantime the passenger train was authorized by the dispatcher to enter the block, also on a caution card; was run at an average speed of 50 miles an hour, and collided with the freight train when that train reduced speed on account of having been flagged. The manual block rules of the rail-

road on which this collision occurred provide for an absolute block ahead of and behind passenger trains except in closing up at stations "or for other equally good reasons, and then only under safe conditions." The dispatcher stated that the provision made by rule for an absolute block was required to be observed only in the case of a train following a passenger train. The accident occurred on the 22d day of the month and during this period of 22 days the average number of caution cards issued daily had been nearly 40.

4.⁴—Rear collision of two freight trains; caused primarily by failure of engineman to operate his train under proper control during foggy weather after receiving a caution signal indication. A manual block rule required use of caution cards, but the dispatcher stated it had been decided that a caution card was not necessary in addition to the block signal indication and in order to avoid congestion of traffic the use of caution cards was abandoned. Specific instructions had been issued by the superintendent, on account of a previous accident, that the use of permissive block-signal indications in foggy weather was strictly contrary to instructions and that under no circumstances was an operator to allow a train to enter an occupied block during a fog unless in possession of a message signed by the train dispatcher. At the time the two trains involved in the accident entered the block it was occupied by a third train, and although there was a question as to whether the dispatcher was at that time advised of the weather conditions, he stated that he usually left to the enginemen the matter of proceeding under a caution block signal indication in foggy weather, as they were better acquainted with the existing weather conditions.

5.⁵—Butting collision between an equipment train and a mail and express train; accident caused primarily by equipment train being authorized to run against the current of traffic in an occupied block; contributing causes were failure of assistant yardmaster and a switchman to furnish proper flag protection. The northbound main track at the station was obstructed, making it necessary for northbound trains to use the southbound track to a crossover near the yard limit board. The southbound mail and express train, which was superior to all trains regardless of class or direction, had entered the block section under a clear signal indication and with no knowledge that the track at the end of the block was being used by opposing trains, although the fact that it was going to be used by the northbound equipment train involved in the accident was known for about 50 minutes before the mail and express train entered the block. The northbound train was operated against the current of traffic a distance of nearly 1 mile on the time of the superior train without any attempt to comply with a manual block rule that when a train is to obstruct the other track the signalman shall notify the trainmaster and obtain authority to issue a crossover card; this crossover card requires the crew of the train receiving it to protect by flag before making the crossover movement. Movements of the kind involved in this accident were not uncommon, but the evidence indicated that crossover cards were not used, while the officers, including the superintendent and the general superintendent, believed that the issuance of caution cards to either train was unnecessary, the only safe way of making such movements being under "proper" flag protection.

6.⁶—Butting collision between a passenger train and a work train; accident caused by work train occupying the main track on the time of the passenger train without flag protection. At the entrance to the block the crew of

¹N. Y., N. H. & H., Pomfret, Conn., April 10, 1918.

²C., M. & St. P., Farmington, Minn., March 4, 1920.

³Wabash, Huntsville, Mo., December 22, 1919.

⁴Erie, Red House, N. Y., October 4, 1918.

⁵Missouri Pacific, Texarkana, Ark., March 18, 1920.

⁶C., B. & Q., Birdsell, Neb., September 10, 1918.

the passenger train received a caution card stating that the block was not clear, and a permissive card directing them to proceed expecting to find a train in the block, which was 11.5 miles in length. The passenger train attained a speed of 45 miles an hour, which was the speed limit for passenger trains, and according to the speed recorder was traveling at the rate of 34 miles an hour at the moment the collision occurred. The engineman's understanding as to how to operate his train under a permissive card was that the engine crew would keep a sharp lookout and keep the train moving in good shape. The accident, however, occurred in a cut on a curve which led to the left for the passenger train and the fireman was engaged in shoveling down coal in the tender. The engineman's understanding of the purpose of the permissive card was that it merely gave notice of a train being in the block and he said that he would look for a flag or some other indication of that train. The engineman also stated that formerly when running under a permissive card it was customary to reduce speed at points where the view was obscured; but this resulted in losing time and instructions were issued to proceed and watch out for a flag. There was nothing in the rules of this railroad company which stated how a train should be operated when running under authority of a permissive card.

Many of the practices referred to are not believed to be isolated or exceptional; similar practices and conditions can no doubt be found in effect on many lines at the present time, and corrective measures should be taken promptly. A considerable number of the accidents referred to in the foregoing may properly be classed as preventable, and it is entirely reasonable to expect that proper action at this time by responsible railroad officers will avert similar disastrous accidents in future.

POLITICAL VIEWS ON THE RAILROAD PROBLEM

THE following are the railroad "planks" in the platforms adopted by the Democratic and Republican parties. They are self-explanatory and are placed side by side without comment that "he who runs may compare."

DEMOCRATIC

"The railroads were subjected to federal control as a war measure. Labor was treated with an exact justice that secured enthusiastic co-operation. The fundamental purpose of the federal control was achieved fully and splendidly. Investments in railroad properties were not only saved by government operation, but government management returned these properties vastly improved.

"The Esch-Cummins bill went to the President in the closing hours of Congress and he was forced to a choice between the chaos of a veto and acquiescence in the measure submitted, however grave may have been his objections to it.

"There should be a fair and complete test of the law until careful and ma-

REPUBLICAN

"We are opposed to government ownership and operation or employee operation of the railroads. In view of the conditions prevailing in this country, the experience of the last two years, and the conclusions which may fairly be drawn from an observation of the transportation systems of other countries, it is clear that adequate transportation service both for the present and future can be furnished more certainly, economically and efficiently through private ownership and operation under proper regulation and control.

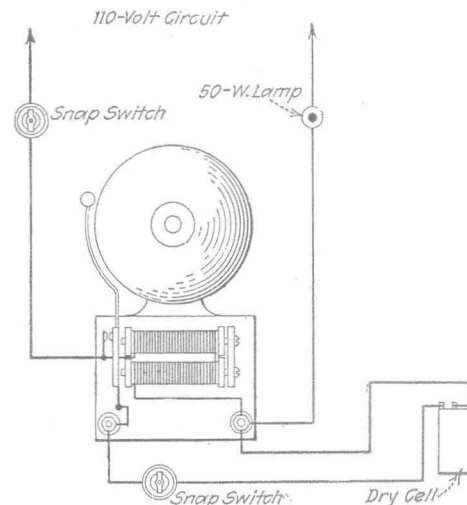
"There should be no speculative profit in rendering the service of transportation, but in order to do justice to the capital already invested in railway credit, to induce future in-

vestments at a reasonable rate, and to furnish enlarged facilities to meet the requirements of the constantly increasing development and distribution, a fair return upon actual value of the railway property used in transportation should be made reasonably sure, and at the same time to provide constant employment to those engaged in transportation service, with fair hours and favorable working conditions at wages or compensation at least equal to those prevailing in similar lines of industry. We indorse the transportation act of 1920 enacted by the Republican congress as a most constructive legislative achievement."

ture action by Congress may cure its defects and insure a thoroughly effective transportation system under private ownership without governmental subsidy at the expense of the taxpayers of the country."

BELL TO INDICATE POWER FAILURE

A WRITER in the *Electrical World* describes a simple and ingenious device for indicating a failure in the power supply. The scheme illustrated has proved very dependable and inexpensive. An ordinary iron box bell is used, the coils being connected permanently in series with a 50-watt, 110-volt lamp to a 110-volt circuit. One



When the Power Circuit Fails the Bell Will Ring With Current from the Dry Cell.

dry cell is connected across the binding posts of the bell. Under ordinary operating conditions, the current through the lamp and bell circuit is sufficient to keep the armature pulled against the pole pieces.

When the armature is in this position, no current flows from the cell through the electro-magnet of the bell, as the contacts are held in the open position. If the main circuit is de-energized the bell armature springs back against the contact breaker, thus closing the circuit to the dry cell, causing the bell to ring in the usual way. If it is desired to eliminate the hum produced by alternating current the bell may be mounted on rubber or cork matting. Of course, if the 50-watt lamp burns out, the bell will ring and will indicate a failure. However, it is easy to find out if it is the lamp and provide a new one if necessary.