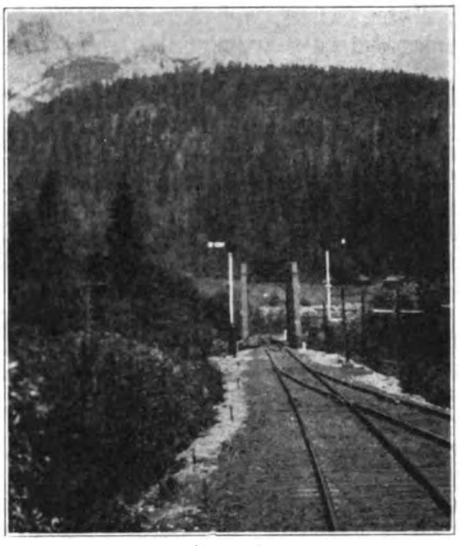
Work in Signal Field Shows Gain Over 1920

Preventing Unnecessary Train Stops



Why Signals Are Needed

Construction Activities Last Year Show Some Improvement Over the Year Before Which Was the Lowest Since 1905

IN reviewing past work it is interesting to note that the block signal mileage (manual and automatic) installed, increased rapidly from 1906 to 1915. The construction curve flattened out materially during 1908 and again, although not to the same extent, in 1913. Construction work was carried on actively in 1914, but slumped decidedly from that date to the present. In 1919 statistics indicated that railway signaling was on the decline, while in 1920 construction activities were lighter than during any period since 1905. Conditions improved but slightly during 1921.

Taking the progress in automatic signal construction for the 10 years preceding 1915 as normal and comparing it with that for the 7 years from January 1, 1915, to January 1, 1922, we find that the progress in the latter years has been far from satisfactory. The average mileage installed for the 10-year period preceding 1915 was 2,448.4, while for the 7-year period to date the average has been 1,291.1 miles. The difference between the two leaves a net deficiency per year of 1,157.3 miles, or a total for the 7 years of 8,101.1. In order to get back to the normal rate of installation (as made prior to 1915), in a period of 5 years it would be necessary for the roads to install a total of 4,068 miles each year for this period. The diagram illustrates the tendencies in signal construction activities occurring since 1906.

Only 830.5 miles of road in the United States and in Canada was equipped with block signals during the past year; there is a total of 174.9 miles under construction in the two countries and 545.5 miles are known to be proposed for 1922.

Sixty-seven interlocking plants were completed; 26 are under construction and 36 are proposed for the coming year.

The tendency is toward the operation of trains by signal indication without written train orders, while automatic train control is being considered more seriously than ever before as an adjunct to block signaling.

Block Signaling Completed in 1921

A total of 830.5 miles of road in the United States and Canada was equipped with block signals during the past year. Part of the mileage represents new construction, a portion represents reconstruction and a part consists of manual block changed to automatic block. Where automatic signaling was in use previously, the changes were due largely to signaling certain tracks for train operation in both directions in order better to effect economies in train operation. Other changes consisted of replacing one type of signals with another or were made because of additional main tracks. One notable feature about the tables presented herewith is the small stretches of automatic signals installed. Station and curve protection, shortening of block sections, better facilities for approaches to yards and small sections of dense traffic territory were the occasions for the majority of the signals installed and this accounts for the small mileage involved at each location. Thirty-one roads built new interlocking plants or made changes in existing ones, affecting a total of 60 plants. Canada is represented by 7 plants.

Comparing the figures for 1921 with those for 1920, published in the January, 1921, issue of the *Railway Signal Engineer*, it is seen that there has been a slight increase in construction work of this character, as the total block signal mileage completed in the United States and Canada during 1921 was 830.5 as compared with 546.3 miles of road in 1920. Of this 830.5 miles, 214.7 represents manual blocking installed, which leaves 615.8 miles of road on which automatic block signals were placed. This figure, however, is likely higher than the actual additional mileage installed because in some cases additions have been made to actual installations in service. A slight increase is thus noted in the additional mileage of automatic signaling constructed, as this is 71.2 miles more than in 1920. Comparing this mileage with that reported by the Interstate Commerce Commission as of January 1, 1921, and which is recorded in the table showing block signals installed in the United States since January 1, 1907, there appears to have been 40.7 miles more automatic block sig-

naling completed during 1921 than in 1920. In each year shown in that table the mileage of automatic block signals installed was more than double that reported for the years 1920 and 1921 with the exception of 1915 and 1919.

Signals Under Construction

In comparing the total mileage of block signals under construction in the United States and Canada on December 31, 1921, with that under construction on the same date in 1920, it is seen that there is now a decrease of 31.9 miles. The total mileage under construction on December 31, 1921, was entirely in the United States, no Canadian roads having reported any work in progress. The work in progress consisted of automatic block signaling exclusively, there being no manual block under construction at the end of the year. Some of the work going in replaces manual blocking, while in other cases it consists of the replacement of one type of apparatus with another.

Work Proposed for 1922

The proposed block signal work for next year represents 545.5 miles of road to be equipped with automatic block signals. It will be noted that this is but 70.3 miles less than was installed during 1921. The plans of many of the roads, however, are very indefinite, as they have not as yet decided on their budgets. Expressions received from a number of the roads would tend to indicate that at least twice this mileage is to be installed unless there is a decided change in the conditions affecting the finances of the railroads. In making a comparison of the block signal mileage proposed for next year with that proposed one year ago it is seen that there is an increase over that of a year ago of 102.7 miles of road. The proposed new work reported is for 509.5 miles of automatic block signals in the United States and 36 miles of the same type in Canada. No proposed manual block signaling is contemplated at the present time.

Interlocking Construction in 1921

There has been a drop in the number of interlocking plants built or rebuilt during the year. In 1920 a total of 72 were built or rebuilt in the United States, and 2 in Canada as compared to 60 this year and 7 in Canada. The number of plants under construction in the United States on December 31, 1920, was 24, and 1 in Canada, as compared to 26 this year, none of which are in Canada. A total of 32 plants was proposed a year ago, none being in Canada, in comparison with a total of 27 for the coming year in the United States and 9 in Canada.

Signal Construction Data

The figures so far available, together with the data covering the work now under construction and in respect to plans for 1922, are shown in the accompanying tables under nine heads as follows:

A.—Automatic Block Signaling Completed in 1921.
B.—Automatic Block Signaling Under Construction.
C.—Automatic Block Signaling Proposed for 1922.
D.—Manual Block Signaling Completed in 1921.
E.—Manual Block Signaling Under Construction (None).
F.—Manual Block Signaling Proposed for 1922 (None).
G.—Interlocking Completed in 1921.
H.—Interlocking Under Construction.
I.—Interlocking Proposed for 1922.

New Block Signals Completed in 1921

	Automatic (Table A)			Manual (Table D)			Both
Tables A-D—	S. T. Miles	D. T. Miles	Total Miles	S. T. Miles	D. T. Miles	Total Miles	Total Miles
United States	295.2	264.1	559.3	214.7	....	214.7	774.0
Canada	52.0	4.5	56 5	....	....	....	56.5

New Block Signals Under Construction December 31, 1921

	Automatic (Table B)			Manual (Table E)			Both
Tables B-E—	S. T. Miles	D. T. Miles	Total Miles	S. T. Miles	D. T. Miles	Total Miles	Total Miles
United States	119.3	55.6	174.9	....	....	....	174.9
Canada	....	....	....	....	....	....	....

New Block Signals Proposed for 1922

	Automatic (Table C)			Manual (Table F)			Both
Tables C-F—	S. T. Miles	D. T. Miles	Total Miles	S. T. Miles	D. T. Miles	Total Miles	Total Miles
United States	347.9	161.6	509.5	....	....	....	509.5
Canada	32.0	4.0	36.0	....	....	....	36.0

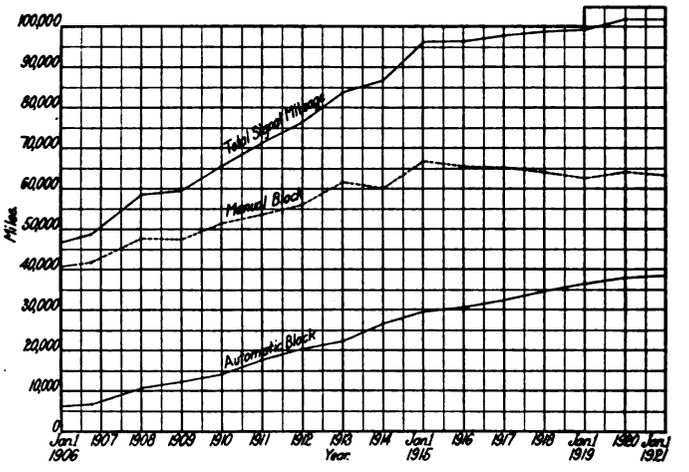
Interlocking Plants

	No. of Plants	Number of Levers Mechanical	Electric
Table G—Completed in 1921			
United States	60	563	439
Canada	7	67	...
Table H—Under Construction Dec. 31, 1921			
United States	26	267	241
Canada	..	...	...
Table I—Proposed for 1922			
United States	27	293	390
Canada	9	98	24
Total United States	113	1,123	1,070
Total Canada	16	165	24
Grand Total	129	1,288	1,094

Total Construction—Thirteen Years—I. C. C. Reports

Year	Miles of Road Automatic Block	Manual Block	Total
1908	1,387.6	—517.6	870.0
1909	2,047.1	4,162.2	6,209.3
1910	3,473.8	2,037.3	5,511.1
1911	2,623.4	2,517.2	5,140.6
1912	1,883.9	5,656.2	7,540.1
1913	4,350.5	—1,563.4	2,787.1
1914	3,030.7	6,577.5	9,542.2
1915	1,113.1	—1,112.0	1.1
1916	1,843.5	—196.9	1,646.6
1917	2,242.2	—1,214 9	1,027.3
1918	1,794.4	—1,398.4	396.5
1919	979.4	1,007.1	1,986.5
1920	575.1	—575.7	—0.6

From the reports received, the largest mileage of automatic signals installed on a single road was on the Missouri, Kansas & Texas, which put in service 153.75 miles of single track using 253 signals. The next largest installations were made on the Cleveland, Cincinnati, Chicago & St. Louis, which put in service 68.7 miles of dou-



Curves Showing Mileage of Block Signals Installed

ble track using 121 signals, and the Great Northern, which installed 58 miles of single track using 111 signals. The Canadian National Railways installed 52 miles of single track and 4.5 miles of double track automatic block signaling using a total of 111 signals. Signals installed on other roads consisted mostly in the protection of short stretches of track or new multiple tracks or for curve and station protection purposes.

But 9 roads report automatic block signals under construction, the greatest mileage reported being by the Missouri, Kansas & Texas, which has 63.5 miles of single track signaling under way, using 98 signals. The Chesapeake & Ohio has under construction 40 miles of single track, A. P. B. color light automatic signals, using 88 light signals, while the Pennsylvania is installing 19.4 miles of double track and 15 miles of four-track position light automatic signals, using a total of 96 signals for this purpose.

Of the 10 roads reporting work proposed for 1922, the Northern Pacific contemplates the construction of 155

Table A — AUTOMATIC BLOCK SIGNALS INSTALLED IN 1921

Name of Road	Miles of Road: Single Track	Miles of Road: Double Track	From	To	No of Signals	Type of Signals	Control System	Remarks
A. T. & S. F.		11.5	Plymouth, Kan.	Strong City	15	Union style "T 2"		
	5.1		Ft. Worth, Tex.	Saginaw	11			
B. & O.		1.2	33rd St. Viaduct	Millvale	5	Union style "T 2"		
		7.1	Bakerstown, Pa.	Callery Jct.	15	Union style "T 2"		
		4.5	Bakerstown, Pa.	Wildwood	14	Union style "T 2"		
C. B. & Q.		33.2	Osceola, Ia.	Creston	100	Motor	Straight automatic	Relayed track.
C. R. I. & P.	.07		M. P. 291.02	M. P. 291.09	2	Motor semaphore	Neutral line	
C. & N. W.	1.47		Belt Line Jct., Wis.	Hurley Jct., Wis.	8	General "2 A"		D. C. 3 pos. U. Q.
Canadian National (Eastern Lines)	20.0		Hampton	Cold Brook	35	Union "T 2"	A. P. B.	Changed from overlap to A. P. B.
	30.0		Painsec Jct.	Sackville	60	General "2 A"	A. P. B.	
		4.5	Charny		12	General "2 A"	Selective automatic	Double track junction.
	2.0		Hervey Jct.		4		Selective automatic	
C. L. S. & S. B.		1.5	Griffin X-over, Ind.	Ice House Switch	7	Color light		A. C. 60-cycle, 3 color.
C. C. C. & St. L.		63.2	Berea, Ohio	Crestline	109	Hall style "L"		D. C. 3 pos. U. Q. bot. post.
		4.9	Beech Grove, Ind.	Indianapolis	12	Hall style "L"		D. C. 3 pos. U. Q. bot. post.
D. L. & W.		0.73 4.4, 3-tk	Hackensack River	Newark, N. J.	41	Color light, 4 unit	D. C. neutral track and A. C. polar line	Tracks 1 and 3 signaled in both directions between Hackensack River and Harrison, track 2 signaled in eastward direction only between these points.
E. J. & E.	0.45		Mill Yard Switching Signals		2	Union style "B," 2 pos.	Track circuit	
G. N.	58.0		Leavenworth, Wash.	Skykomish	100	General "2 A"	Polarized line	D. C. 3 pos. U. Q. top post.
					11	Color light		Light signals used in snow sheds.
G. T. Canada and New England	13 5		Oxford, Me.	Danville Jct.	22	General "2 A"	A. P. B.	
		1.5	Komoka	Danville Jct.	2	General "2 A"	Station protection	
	1.5		Port Hope	Danville Jct.	2	Federal		
I. C.	19.7		Ilsley, Ky.	Princeton	36	Hall style "L" U. Q. N. C.	Traffic direction	
Kensington & Eastern		1.5	Kensington, Ill.	Ice Company X-over	7	Union model "L" light		
I. R. T. (New York)		1.0 3-track	158th St.	174th St. (Suburban Line)	11	6 color light; 5 elec. pneu. semaphore	A. C. single track circuits	Two local tracks signaled at curves.
		1.06 3-track	125th St.	155th St. (9th Ave. Line)	23	Color light	Elec. pneu. auto. stops	Two local tracks signaled at curves and intlgs. Middle tracks signaled for both directions for 1 min. 30 sec. headway.
		1.06 3-track	91st St.	125th St. (2nd Ave. Line)	21	Color light	D. C. battery control for local and relays	Two local tracks signaled at curves and intlgs. Middle track signaled for both directions for 1 min., 30 sec. headway.
M. K. & T.	0.75		Dallas, Tex. Yards		5	3 style "S," 2 light, Union	Light	Electric lights, burn continuously.
	2.0		San Antonio, Tex.		2	Style "L" light	Automatic	Electric lights, approach control.
	1.5		Colbert	Red River	4	Style "S," Union	Automatic	Electric lights, approach control.
	38.0		McAlester, Okla.	Springtown	62	Style "S," Union	Automatic	Electric lights, approach control.
	66.0		McAlester, Okla.	Wybark	109	Style "S," Union	Automatic	Electric lights, approach control.
	44.0		Labette, Okla.	Vinita	67	Style "S," Union	Automatic	Electric lights, approach control.
	1.5		Oklahoma City, Okla.	Yards	4	Style "S," Union	Automatic	Electric lights, approach control.
L. & N.		4	Mayton, Tenn.	Brentwood	9	A. C. semaphore	Polarized track	
N. Y. N. H. & H.		1.25	New Haven, Conn.		4	2 Union light, 2 G. R. S. semaphore		Tracks Nos. 1 and 2 of 4 tracks, reverse traffic signaling.
N. Y. Connecting		8.14	Fresh Pond, N. Y.	Oak Point	4	1 Union semaphore, 3 G. R. S. semaphore		To replace manual block, U. Q. L. H.
P. & R.		3.1	Fifth St., Reading, Pa.	Wyomissing	7	Union "T 2"		A. C. 3 pos. U. Q. top post.
		0.9 3-track	Lebanon, Pa.	Front St., Lebanon, Pa.	3	Union "T 2"		A. C. 3 pos. U. Q. top post, 1 Hall disc.
		4 6 4-track	Myerstown, Pa.	Lebanon, Pa.	16	Union "T 2"		A. C. 3 pos. U. Q. top post.
Pennsylvania System—								
Eastern Region		4.7	Mt. Vernon	Hollins	11	9 pos. light, 2 motor	A. C. polarized	Replaced manual block.
Central Region		10.0	Altoona, Pa.	Gallitzin	32	Grade signal aspect		To permit tonnage freights to pass automatic signals.
		21.6	Conemaugh, Pa.	Gallitzin	50	Grade signal aspect		
St. L.-S. F.		29.9	Various points		45			Single track changed to double track.
S. P.—								
Texas & Louisiana		2.05	El Paso, Tex.	Rio Grande River	6	Union style "B"	Neutral track and polarized line	D. C. L. Q.
		0.75	Englewood, Tex.	Baer Jct.	6	Union style "B"	Neutral track and polarized line	D. C. L. Q.
Pacific System	6.3		Hornberg, Ore.	Gregory, Ore.	22	Union		
	10.3		Portland, Ore.	Beaverton	19	Light		A. C. color.
U. P.		34.8	Leroy, Wyo.	Wahsatch, Utah	*143	U. S. & S. style "B" L. Q. 2 pos.		Two arm home and dist. without overlaps. *Blades.
O. S. L.			Various points		27	Motor semaphore	Neutral	Added to existing installation, account new passing tracks.
W. B. & A.	18.2				31	Union		Color light.
Western Maryland	2.4		Williamsport, Md.	Pinesburg	9	Union style "S"	Track	U. Q. 3 pos. Change from single to double track.
Totals	347.2	268.6			1384			

Table B — AUTOMATIC BLOCK SIGNALS UNDER CONSTRUCTION DECEMBER 31, 1921

Name of Road	Miles of Road: Single Track	Miles of Road: Double Track	From	To	No. of Signals	Type of Signals	Control System	Remarks
B. & O.		10.0	Wildwood, Pa.	Pine Creek	22	Union style "T 2"		
C. & O.	40.0		Charlottesville, Va.	Staunton	88	Union light	Line A. P. B.	Color light.
C. & A.		4.0	Manchester, Ill.	Roodhouse	2		Track	2 pos. L. Q.
I. C.		3.5	Paducah, Ky.	Yards	11	Hall style "L"	Overlap	
I. R. T. (New York)		3.7 3-track	143rd St.	Fordham Road (Suburban line)	53	Color light	D. C. battery control for local relays	Local tracks signaled at curves and interlockings. Middle track signaled for both directions for 1 min. 30 sec. headway.
D. & H.	13.0		Schenevus, N. Y.	East Worcester	14	Motor semaphore	Track and line	U. Q. 3 pos. Normal danger.
Pennsylvania— Eastern Region		15.0 4-track	Atglen	Downingtown	57	General pos. light	A. C. polarized	Replace electro-pneumatic and motor A. B. S.
		19.4	Egg Harbor	Atlantic City	39	Union pos. light	D. C. polarized	Approach lighting.
M. K. & T.	56.5		Vinita, Okla.	Wybark	87	Union style "S" U. Q.	Automatic	Equipped with approach electric lights.
	7.0		Lamar, Tex.	Bona	11	Union style "S" U. Q.	A. P. B.	Equipped with approach electric lights.
Western Pacific	2.81		Niles, Calif.		5	Union style "B"		D. C. 3 pos. U. Q.
Totals	119.3	55.6			389			

Table C — AUTOMATIC BLOCK SIGNALS—PROPOSED NEW CONSTRUCTION

Name of Road	Miles of Road: Single Track	Miles of Road: Double Track	From	To	No. of Signals	Type of Signals	Control System	Remarks
A. T. & S. F.		10.2	Nerska, Ill.	Willow Springs, Ill.	13	Union style "T 2"	Neutral track	
		8.9	New Boston, Mo.	Dumas, Mo.	12	Union style "T 2"	Neutral track	
		23.9	Olathe, Kan.	Le Loup, Kan.	25	Union style "T 2"	Neutral track	
		14.6	Neva, Kan.	Cedar Point, Kan.	28	Union style "T 2"	Neutral track	
	6.8		Wolton, Kan.	Newton	2	Union style "T 2"	Neutral track	
C. & O.	4.0		Stollings, W. Va.	Rum Creek Jct.	3		A. P. B.	
C. & A.		6.0	Godfrey, Ill.	Brighton	4	Motor semaphore	Track circuit	2 pos. L. Q.
Canadian National (Eastern Lines)	6.0	4.0	Levis	Chaudiere	24		A. P. B. and polar line	
	26.0		Sackville	Springhill	54		A. P. B.	
G. N.	165.0							
Illinois Traction Co.	16.0		Staunton, Ill.	Edwardsville	37	Motor semaphore	Track circuit	
N. P.	155.0	48.0	Dilworth, Minn.	Mandan, N. D.	378	G. R. S. model "2 A," 3 pos.	A. P. B. on single track	
			Garrison, Mont.	Missoula				Change from D. C. to A. C. track circuits.
Pacific Electric		3.0 4-track	Indian Village, Calif.	Sierra Vista	20	Color light		A. C.
Pennsylvania System— Central Region		18.3	Ingram	Bulger	87	Position light	Track and line	
		6.8	Collier, W. Va.	Wheeling Jct.	45	Position light	Track and line	
		21.9	Jewett, Ohio	Dennison, Ohio	90	Position light	Track and line	
Western Pacific	1.16		Marysville, Calif.		5	Union style "B"	A. C. track circuit	D. C. operated.
Totals	379.9	165.6			827			

Table D — MANUAL BLOCK SIGNALING INSTALLED IN 1921

Name of Road	Miles of Road: Single Track	Miles of Road: Double Track	From	To	No. of Signals	Type of Signals	Control System	Remarks
Canadian National (Eastern Lines)			Joffre		5	General "2 A"	Selective non-automatic	Manual.
C. & N. W.	61.0		New Ulm, Minn.	Tracy	9	2 pos. L. Q.	Manual	
Ft. W. & D. C.	141.0		Wichita Falls, Tex.	Ft. Worth	16	2 arm	Manual	
L. A. & S. L.	2.6		Crestmore, Cal.	Ormand	2	U. S. & S.	Line	Absolute staff hand operated.
Mo. Pac.	2.3		Edgewater Jct., Kan.	Ramapo	3	2 pos. U. Q.	Manual	
St. L.-S. F.	7.8		Marion				Train staff	
Totals	214.7				32			

Table G — INTERLOCKING PLANTS COMPLETED IN 1921

Name of Road	Location	Layout—Crossing, Junction, Terminal, Etc.	No. of Working Levers: Mechanical	Electrical	Electro-Pneumatic	Remarks
A. T. & S. F.	Newkirk, Okla.	Junction		15		
A. C. L.	Allenhurst, Ga.	Crossing	6			Door locked.
B. & O.	Tates Point, Ohio.	Crossing	34			
B. & M.	S. Lawrence, Mass.	Engine house facilities	24			
C. P. R.	Montreal	Crossing	10			
	Watson, Sask.	Crossing, C. N. R.	13			
C. R. R. of N. J.	Phillipsburg, N. J.	Crossing and Junction			45	A. C. track circuits.
C. & O.	Big Sandy Jct., Ky.	Junction	5	5		Union. Electro-mechanical.
C. & N. W.	Hurley, Wis.	Junction	8			
C. C. C. & St. L.	Burt-Galion, Ohio.	Crossing and Junction	50	12		Electro-mechanical. Detector and route locking.
	Ansonia, Ohio.	Crossing, C. N. Division	41	10		Electro-mechanical. Detector and route locking.
	Briar (Action, Ind.)	End double track	10	6		Electro-mechanical. Route and detector locking.
	Beech Grove, Ind.	Terminal	10	7		Electro-mechanical. Route and detector locking.
	Winchester, Ind.	Crossing, G. R. & I.	32	10		Electro-mechanical. Route and detector locking.
	Greenville, Ohio.	Crossing, D. & U.	14			Mechanical.
Can. Nat. Grand Trunk Pacific	Saskatoon	Junction and Crossing	9			Levers added.
	Saskatoon	Junction and Crossing	5			Levers added.
Can. Nor. Eastern Lines	Joliette, Que.	Crossing, C. P. R.	13			Rebuilt.
	Washago, Ont.	Swing bridge	12			
	North Bay, Ont.	Crossing	5			Levers added.
D. L. & W.	Hackensack	Drawbridge		4	11	Switches. Electro-pneumatic, signals 4-unit color type, D. C. track circuits, route locking, check locking between towers, all functions A. C. control.
	Kearney	Junction		4	11	
	Harrison Yard	Switches		7	15	
	Newark, N. J.	Begin third track		5	8	
	Newark, N. J.	Drawbridge	8			
Erie	Newark, N. J.	Drawbridge		11		
G. N.	Carlton, Minn.	Crossing and Junction		57		Track circuit locking.
G. T. Western Lines.	Pontiac, Mich.	Crossing		22		Electric. Trolley contact controls locking on electric line.
	Pontiac, Mich.	Crossing	13			Mechanical. Trolley contact controls locking on electric line.
	Battle Creek, Mich.	Crossing				Four electric signals controlled by clock-work time release operated by gate tender.
I. C.	Ramsey, Ill.	Crossing	29			
K. C. S.	De Queen, Ark.	Crossing	12			Detector circuits, power distant signals.
	Worland, Mo.	Crossing	13			Detector circuits, power distant signals.
L. & N.	Mayton, Tenn.	Junction	8			Temporary layout.
	Brentwood, Tenn.	Junction	4			Table lever.
	Biloxi, Miss.	Drawbridge	8			Electro-mechanical. Rebuilt.
M. K. & T.	Ft. Worth, Tex.	Yards, Crossing	23			Approach and detector.
Mo. Pac.	Harviell.....Mo.	E. D. T.	12			Approach and detector locking.
	Cypress Jct., Ark.	E. D. T.	4			Approach and detector locking.
	Clear Lake Jct., Ark.	E. D. T.	4			
	Cochrane, Kan.	Junction	12			Replaces 8-lever machine.
	Wolcott, Kan.	End Passing Siding	15			Detector locking.
	Nearman, Kan.	End Passing Siding	12			Detector locking.
	Kansas City, Kan.	Crossing	3			Semi-automatic block protection.
N. Y. C.	Rotterdam Jct.	Junction	50			Renewal, R. & A. locking, S. S. relay controls.
Mich. Cent.	Detroit, Charlevoix St.	Crossing			16	Electric.
	Detroit, Buchanan St.	Crossing	7		5	Electro-mechanical.
	Detroit, Palmer Ave.				10	Electric.
N. Y. N. H. & H.	Providence, R. I.	Hump Yard			23	U. S. & S., push-button mach.
	New Haven, Conn.	Hump Yard			36	U. S. & S., push-button mach.
	New Haven, Conn.	Terminal Yard	12			S. & F.
N. P.	Sauk Center, Minn	Crossing and Junction	8			Added to existing machine.
	Mississippi St., St. Paul	Junction				Detector bars replaced by circuits.
	Belgrade, Mont.		2			Train order signal added.
Pacific Electric.	Wisburn, Cal.	Crossing	8			A. C. track circuits on P. E. and D.C. on Santa Fe. Time locks and power signals.
Pennsylvania... Southwestern Region	Richmond, Ind.	Switching		44		G. R. S. electric. Route and detector locking. Position light dwarf signals.
East. Region.	Canton, Md.	Crossing	15			Electro-mechanical. Pos. light signals.
P. & R.	Myerstown, Pa.	Switching		23		
South. Railway	Tenbridge, Tenn.	Drawbridge			7	G. R. S. electric. Model 2.
	Warrior River, Ala.	Drawbridge			6	G. R. S. electric. Model 2.
	Demopolis, Ala.	Crossing	3			Mechanical. Ground lever.
South. Pac. Texas and Louisiana	El Paso, Tex.	Junction	7			Mechanical. Approach and detector locking.
	El Paso, Tex.	Crossing	3 added			Approach, detector and route locking added.
	Englewood, Tex.	Junction and Yard	5 added			
T. St. & W.	Ramsey, Ill.	Crossing	29			
U. P. System O. S. L.	Salt Lake City, U.	Terminal			4	Levers added.
Totals			630	242	197	

Table H — INTERLOCKING PLANTS UNDER CONSTRUCTION DECEMBER 31, 1921

Name of Road	Location	Layout—Crossing, Junction, Terminal, Etc.	No. of Working Levers: Mechanical	Electrical	Electro-Pneumatic	Total	Remarks
A. C. L.	Ashley River	Drawbridge.	4			4	Electro-mechanical.
B. & O.	Mountain Lake Park, Md.	Junction	43			43	Electro-mechanical.
B. & M.	Concord, N. H.	Engine house facilities		6		6	Electric.
C. & O.	Hinton, W.Va. (MX)	Terminal	9	11		20	Federal. Electro-mechanical.
D. & H.	Schoharie Jct.	Junction		25		25	Electric. Concrete trunking.
I. C.	West Waterloo, Ia.	Crossing	15			15	
I. R. T. (New York)	180th St., White Plains Road				44	44	51 lever frame.
	New Lots Ave. E. Parkway line.				10	10	11 lever frame.
Grand Trunk—Western Lines	Pontiac, Mich.	Crossing	24			24	Mechanical. Trolley contactor controls locking on electric line.
	Detroit, Mich.	Crossing	18			18	Mechanical. Trolley contactor controls locking on electric line.
Pennsylvania System—Eastern Region	Caln, Pa.	Switching			18	18	These plants are being reconstructed and position light signals are used to replace semaphore signals.
	Parkesburg, Pa.	Switching			27	27	
	Thorndale, Pa.	Switching			21	21	
	Coatesville, Pa.	Switching	27			27	
L. & N. E.	Bath, Pa.	Crossing, D. L. & W.	6			6	Power signals, electric time locks.
	Nazareth, Pa.	Crossing, D. L. & W.	5			5	Power signals, electric time locks.
Mo. Pac.	Hiawatha, Kan.	Crossing	25				Approach and detector locking.
	Dudley, Mo.	Crossing	19				Approach and detector locking.
N. Y. C.	Syracuse Jct., N.Y.	Junction	35			35	Renewal, R. & A. locking, S. S. control.
	Finch, N. Y.	Crossing	20			20	Route locking.
U. P.	Aspen, Wyo.	Tunnel and double trk.		20		20	G. R. S. Mod. 2 A. Check lock through tunnel.
	Altamont, Wyo.	Tunnel and double trk.		21		21	G. R. S. Mod. 2 A. Check lock through tunnel.
	Council Bluffs, Ia. A.	Terminal and Jct.		12		12	Added to G. R. S. Mod. 2.
	Council Bluffs, Ia. B	Terminal and Jct.		16		16	U. S. & S., style F.
Wabash	Detroit, Mich. River Rouge	Drawbridge and Jct., D. T. & I.		10		10	Union, D. C. Type F. Electric.
Western Pacific	San Jose, Cal. Vabrick	Crossing	17			17	
Totals			267	121	120	508	

Table I — INTERLOCKING PLANTS PROPOSED FOR 1922

Name of Road	Location	Layout—Crossing, Junction, Terminal, Etc.	No. of Working Levers: Mechanical	Electrical	Electro-Pneumatic	Total	Remarks
A. C. L.	Boydville, Ga.	Crossing	6			6	Door locked.
C. & E. I.		Crossing	16			16	Mechanical.
C. & O.	Cincinnati, Ohio	Terminal			28	28	Electro-pneumatic.
	St. Albans, W. Va.	Junction	8	19		27	Electro-mechanical.
Can. Nor.	Allenby Jct.	Crossing	5				Levers added
	Tweed	Crossing					Rebuilding.
	St. Cloud	Crossing					Rebuilding.
	Harrowsmith	Crossing	20			20	Mechanical with elec. distant signals.
	Washago	Junction	21			21	Mechanical with elec. distant signals.
Can. Nat.—G. T. Pac.	North Edmonton	Crossing and Junction	40			40	Electric route and approach locking.
	Alix	Crossing and Junction	12	8		20	Electro-mechanical, elec. outlying switches.
	Portage la Prairie	Crossing and Junction					Rebuilding; electric signals.
Eastern Lines	Charny, Que.	Junction		16		16	Interlocker in station.
G. T. (W. L.)	Charlotte, Mich.	Crossing		22		22	Electrical.
I. R. T. (N. Y.)	Jerome Ave. Yard.				50	50	59 lever frame.
	New Lots Ave. Yd. E. Parkway Line				32	32	35 lever frame.
	240th St., White Plains Road				52	52	59 lever frame.
M. K. & T.	Hallett, Okla.	Crossing	12			12	Approach and detector locking.
	Mound City, Kan.	Crossing	18			18	Approach and detector locking.
Mo. Pac.	Belt Jct., Mo.	C. & J.	28				Approach and detector locking.
	Pleasanton, Kan.	Crossing	15				Approach and detector locking.
	Claremore, Okla.	Crossing	19				Approach and detector locking.
	Dodson, Kan.	Crossing	28				Approach and detector locking
	Kenneth, Kan.	Crossing	21				Approach and detector locking.
K. C. S.		Crossing	13			13	Mechanical, details not determined.
		Crossing	13			13	Mechanical, details not determined.
		Crossing	14			14	Mechanical, details not determined.
Pacific Electric	Neitos, Cal.	Crossing	15			15	Mechanical, A. C. track circuits on P. E. and D. C. on Santa Fe Detector locking.
	Sierra Vista, Cal.	Junction		56		56	Electric approach and detector locking.
P. & R.	Essington, Pa.	Drawbridge.	2	5		7	Electro-mechanical.
	Darby Creek. Atlantic City, N.J.	Drawbridge.	10	19		29	Electro-mechanical.
	Allentown, Pa.	Junction			53	53	Electro-pneumatic.
	Harrisburg, Pa.	Junction, P. H. & P.			42	42	Electro-pneumatic.
	Schuylkill Haven, Pa.	Switching	35			35	Mechanical.
S. F.-S.	Oakland, Cal.	Junction			12		Addition to existing plant.
Western Pacific	San Jose, Cal.	Crossing	20			20	Mechanical.
Totals			391	145	269	805	

miles of single track and 48 miles of double track signaling, using 378 signals. This road also contemplates replacing d.c. track circuits with a.c. track circuits on 68 miles of road. The Great Northern has in view the construction of 165 miles of single track automatic signaling using 250 signals, while the Atchison, Topeka & Santa Fe contemplates 6.8 miles of single track and 57.6 miles of double track automatic block signaling, using 80 signals for this purpose. The reports from the various roads on proposed work are rather incomplete, as many have not as yet prepared their programs or had their budgets approved for the 1922 work. The Canadian National Railways propose to install 32 miles of single track and 4 miles of double track automatic block signaling during the coming year.

The manual block signaling installed during 1921 consisted of 214.7 miles of single track, 141 miles of which was on the Fort Worth & Denver City, a total of 16 two-arm signals being used. The Chicago & North Western installed 61 miles using 9 two-arm signals, while the Los Angeles & Salt Lake put in service 2.6 miles of controlled manual block, using the absolute staff system. No signaling of this character was under construction at the end of the year, or proposed for the coming year.

Automatic Train Control

An installation of automatic train control is under construction on the Chesapeake & Ohio, between Charlottesville, Va., and Staunton, a distance of 40 miles. An a.c. power transmission line is being built over this territory and color light signals are to be used in connection with the train control. This installation is in single track territory. The Chicago, Lake Shore & South Bend reports 1½ miles of automatic train control placed in service.

Interlocking Construction Data

Thirty-one roads report interlocking plants as completed or reconstructed during the past year. Table G gives this list in detail. It is necessary that this be considered more as an exhibit of the work done than as showing the precise amount of the increase of such apparatus in use in the country as some of the figures represent reconstruction or enlargements and some duplications necessarily occur as a plant may be reported by two or more roads. The same remarks apply also to Tables H and I.

Aside from the small amount of work completed, under construction or contemplated, it is interesting to note that the plants are all of a comparatively small size. A number of electro-mechanical plants appear in the tables as do additions of electric units to existing plants converting the mechanical machines into electro-mechanical ones to make it unnecessary to enlarge existing towers. Considerable work has been done in replacing mechanical detector bars with detector locking.

An analysis of the plants shows that the largest electric plant completed during the year is one of 57 working levers at Carlton, Minn., on the Great Northern, while the next largest is one having 44 working levers at Richmond, Ind., on the Pennsylvania. The third largest plant of this type had 23 working levers and was installed at Myerstown, Pa., on the Philadelphia & Reading. The largest electro-pneumatic machine completed was one having 45 levers, in service at Phillipsburg, N. J., on the Central Railroad of New Jersey.

Two electro-pneumatic push button machines were reported as completed in 1921. The New York, New Haven & Hartford installed both machines for hump yard operation, one having 36 push buttons being placed in service at New Haven, Conn., and the other with 23 push buttons was installed at Providence, R. I.

Seven electro-mechanical plants were reported as completed; one plant on the Cleveland, Cincinnati, Chicago & St. Louis having 50 mechanical and 12 electric working levers and another on the same road having 41 mechanical and 10 electric working levers.

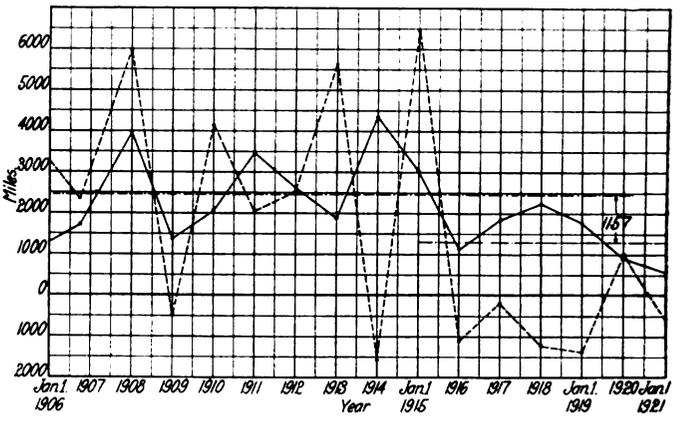
The largest mechanical plant installed was on the Baltimore & Ohio at Tates Point, O., and had 34 working levers. The next largest plant consisted of 29 working levers and is on the Illinois Central at Ramsey, Ill. Other plants range in size from one of three levers up to the largest mentioned above. One plant is of the cabin door lock type, while others are equipped with a.c. track circuits, time locks, electric and detector locking; power distant signals and position light signals.

Interlocking Plants Under Construction

The largest electric interlocking plant under construction on December 31, 1921, was at Schoharie Junction, New York, on the Delaware & Hudson and consists of 25 working levers. The next in size is one having 21 working levers at Altamont, Wyo., on the Union Pacific.

The Interborough Rapid Transit, New York City, has under construction two electro-pneumatic plants, one of 44 working levers located at 180th street on the White Plains Road line and the other with 10 working levers at New Lots avenue, on the East Parkway line.

The largest electro-mechanical plant under construction as of the above date is one of 43 working levers at



Signal Construction Since 1905. Dotted Line, Manual Block; Solid Line, Automatic. Average Deficiency in Automatic Block Signal Mileage Installed Is 1,157 Miles a Year Under That for Period, 1905-1914

Mountain Lake Park on the Baltimore & Ohio, while the Chesapeake & Ohio is building one having 9 mechanical and 11 electric working levers at Hinton, W. Va.

The largest mechanical plant under construction is one having 25 working levers at Hiawatha, Kan., on the Missouri Pacific; the next largest being one of 24 working levers at Pontiac, Mich., on the Grand Trunk, Western Lines; the third largest being one of 20 working levers at Finch, N. Y., on the New York Central.

Proposed Interlocking Work

Of the plants proposed for 1921, the largest electric plant is one of 56 working levers to be located at Sierra Vesta, Cal., on the Pacific Electric; the next largest being one of 22 working levers at Charlotte, Mich., on the Grand Trunk, Western Lines.

The Interborough Rapid Transit, the Chesapeake & Ohio and the Philadelphia & Reading report proposed installations of electro-pneumatic plants during the present year. The first named road is planning on three plants of 52, 50 and 32 working levers, respectively;

the second road proposed to build a 28-lever machine, while the P. & R. contemplates installing one of 53 working levers and one of 42 working levers. The San Francisco-Sacramento proposes to enlarge a plant at Oakland, Cal., by the addition of 12 electro-pneumatic levers.

The largest electro-mechanical plant in prospect is one of 10 mechanical and 19 electric working levers at Atlantic City, N. J., on the P. & R. The second largest will consist of 8 mechanical and 19 electric working levers at St. Albans, W. Va., on the C. & O.

The Philadelphia & Reading proposes to install a 35-working lever mechanical interlocking at Schuylkill Haven, Pa., while the Missouri Pacific contemplates constructing two plants of 28 levers each, one at Belt Junction, Mo., and the other at Dodson, Kan. The Missouri, Kansas & Texas contemplates one of 18 working levers at Mound City, Kan.

Perhaps the only case on record in which signals and interlockings are installed, maintained and operated for a railroad company by a telegraph company is that of the Bangor & Aroostook, on which the Northern Telegraph Company owns and operates all telegraph lines and also has direct supervision over new telegraph and telephone, signal and interlocking construction work.

The General Outlook

The general outlook a year ago appeared favorable for increased signal construction, but instead work during the year 1921 has been largely in a state of coma as compared to that during normal periods. For the coming year returns indicate that prospects in general are not bright for signal construction work in the eastern and southeastern sections of the country, while in the central, northwestern and southwestern sections indications point to a renewal of signal work. About the same condition prevails as to the approval of budgets. Returns indicate that 8,600 miles of automatic block signals and 95 interlocking plants should be installed to meet the traffic conditions adequately. The extent to which these needs will be met in 1922 depends on business conditions. The maintenance work in practically all cases is up to standard and it is the expectation to keep it in this condition, although a few roads report this as being from 6 months to 3 years back.

One condition which appears to have influenced signal construction to a certain extent is the price of signal materials. On the one hand, the railroads are waiting until a more extensive reduction is made in the prices of such equipment, while the manufacturers find that their actual costs are as high or higher than during the war because the small volume of business is not sufficient to pay for the labor and material and to take care of the overhead, the actual cost of production being greater than the selling price in many instances. When production takes place on an extensive scale to fill increased orders prices should descend accordingly.

Developments of the Past Year

A review of the conditions during the past year shows that the tendency is towards better train operation by signaling selected stretches of track for movements in either direction. The movement of tonnage trains has also been facilitated in some localities by the installation of grade signal aspects. Railway men in general have shown a keener appreciation of the value of automatic signaling with reference to its use in effecting economies in train operation. In this connection the elimination of the "31" train order in automatic signal territory has been put into effect to a limited extent on some roads, while other roads are considering such a step. Studies have been made looking toward operating trains on single track by signal indication without written train orders. The elimination of the derail is a subject which has also been receiving serious consideration as has the development of automatic crossing protection to eliminate the use of an interlocking tower and the necessary attendants. Low voltage switch movements for the remote control of switches at passing sidings, junction points, etc., is also a live question and installations are being made. Automatic train control is being given serious consideration not only by the well-informed and progressive railroad officers, but by the Interstate Commerce Commission and by the Joint Committee on Train Control of the American Railway Association. An extension of train control is being made on one road, while arrangements have been made for testing out devices possessing merit under actual railway service on other roads.

In the engineering end the electric lighting of signals has proved economical and has made rapid advances the past year and a greater use of the primary battery has taken place. A study of track circuit conditions has pointed out ways of effecting other economies in signal maintenance. The color and position light signals are being used more extensively than ever before. The use of the mechanical rectifier for charging storage batteries for operating automatic signals and highway crossing warnings is receiving careful consideration, and installations already have been made. The use of portable power units for operating tools and for signal bonding has been another development of interest. At interlocking plants many mechanical detector bars have been eliminated and replaced by electric detector locking. The use of heavier rails has contributed largely to this. Highway crossing protection has received careful study and consideration of signal department officers.

Future developments of signaling will continue along the line of expediting train movements; means will be provided for the handling of the trains by signal indication and greater use will be made of remote controlled switches which will be placed under the control of the leverman and operated from the nearest interlocking or station. Greater use will be made of the light signals and the installation of light signals with automatic train control as an adjunct with the elimination of the derail will be a development of the near future. Train operation by signal indication without the use of written train orders should make rapid progress, while automatic crossing protection for outlying crossings will likely be installed at certain locations during the present year.

Changes in Personnel of Signal and Supply Fields

The past year has witnessed a number of changes in the signal and supply fields, while on some railroads changes in organization have occurred, as well as changes in titles of certain officers. The *Railway Signal Engineer* during the past year has mentioned the changes occurring and the activities of the separate fields, and a review of the various departments during the year just past is given below:

Signal Department Officers

W. M. Vandersluis, signal engineer of the Illinois Central, was appointed secretary of the Illinois Central Electrification Commission—Chicago Terminals.' H. G. Morgan, office engineer in the signal department of the Illinois Central, was promoted to signal engineer, succeeding W. M. Vandersluis. P. S. Lewis, at one time supervisor of signals at the Atlantic City railroad, was appointed superintendent of that road.

H. D. Lyon, formerly inspector, was appointed senior railway signal engineer, Bureau of Safety, Interstate Commerce Commission, and assigned to work in connection with tests and development of automatic train control devices. P. W. Jones, draftsman in the signal department of the Chicago & Northwestern, resigned to go with the Bureau of Valuation, Interstate Commerce Commission, Eastern district, with headquarters at Washington, D. C., as engineer examiner. Robert B. Johnson, in the Bureau of Valuation of the Interstate Commerce Commission, Washington, D. C., was appointed signal engineer examiner in the Bureau of Safety.

William Morrison, assistant signal engineer of the electric division of the New York Central, was transferred to the position of assistant engineer in the same territory. E. A. Black, chief signal inspector, was appointed signal supervisor, and on September 30, having reached the age limit, Mr. Black retired. K. F. Wakeman, assistant signal supervisor on the New York Central, Lines West, was appointed signal supervisor, succeeding Mr. Black. N. Bousquet, signal inspector, was appointed assistant signal supervisor, succeeding Mr. Wakeman, and T. J. Jackson was appointed signal inspector.

Neal E. Simpson, assistant signal valuation engineer of the Chicago, Milwaukee & St. Paul, was appointed signal inspector in the signal department, succeeding J. H. Dunn, resigned to become associate editor of the *Railway Signal Engineer*.

J. J. Crowe, R. C. Gardner and J. E. McDonald, formerly signal inspectors on the Canadian National Railways, Lines West, were promoted to signal supervisors. L. A. Guthrie, signal inspector of the Canadian National Railways, was appointed signal supervisor with jurisdiction over Canadian National Railways, Central district, and Grand Trunk Pacific Lines, between Winnipeg and Watrus. John S. Crowe, signal inspector, was promoted to signal supervisor, Canadian National Railways, with headquarters at Edmonton, Alt.

Thomas McDermott, maintainer of electric interlocking on the Southern, was promoted to signal supervisor. C. M. Steinmetz was appointed signal supervisor of the C. C. C. & St. L., with headquarters at Springfield, Ohio, to succeed J. H. Ross. D. W. Downer, assistant signal supervisor, Los Angeles division of the Southern Pacific, was appointed signal supervisor, succeeding C. A. Veale, promoted. Norman E. Brewer, assistant signal supervisor on the Union Pacific, was promoted to supervisor.

H. M. Sova, assistant supervisor of signals, Northern Pacific, was made assistant in charge of Lines East of Mandan, N. D.; F. L. Eukes, assistant supervisor of signals, was made assistant in charge of territory from Mandan, N. D., to Paradise, Mont.; Paul Amann, assistant supervisor of signals, was made assistant in charge of territory from Mandan, N. D., to Paradise, Mont.; J. P. Rohner and E. M. Sconce, assistant supervisors of signals, were made assistants in charge on Lines West.

K. W. Spain, signal supervisor on the Cedar Rapids division of the Chicago, Rock Island & Pacific, was promoted to general signal inspector, with headquarters at Chicago in charge of construction. J. P. Zahnen, assistant signal supervisor, was promoted to signal supervisor, succeeding Mr. Spain. J. H. Malloy, chief draftsman, was promoted to office engineer at Chicago.

Signal Supply Field

Sidney G. Johnson, formerly vice-president and general sales manager of the General Railway Signal Company, was appointed eastern sales representative for the Hazard Manufacturing Company, and also assistant to the president of the Chicago Railway Signal & Supply Company, with headquarters at New York. A. P. Van Schaick was appointed general manager of sales of the Page Steel & Wire Company, succeeding E. C. Sattley, who resigned to take part in forming a new corporation under the name of Iron & Steel Products Co. Charles S. Pflasterer, assistant manager of the railroad department of the National Carbon Company, Inc., Cleveland, Ohio, was appointed railroad sales engineer of the Twin Dry Cell Battery Company of Cleveland. Walter R. Pflasterer, railway sales engineer of the National Carbon Company, Chicago territory, resigned on September 1, to enter business for himself, organizing the Direct Sales Company of Chicago, of which he is general sales manager.,

Howard H. Marsh, district manager of the *Railway Signal Engineer* and other Simmons-Boardman publications, resigned to become president of the Victory Equipment Company of New Orleans, La. J. E. Willing, signal inspector of the New York Central, Lines West, was appointed inspection engineer of the Federal Signal Company with headquarters at Albany, N. Y.

Owing to the death of Charles B. Schoenmehl and E. E. Hudson, officers of the Waterbury Battery Company, a complete reorganization of its officers and directors took place. Martin L. Martus, secretary and factory manager of the company, was elected president, and G. A. Nelson was made vice-president and general sales manager.

A. H. Handlan, Jr., vice-president and manager of the Handlan Buck Mfg. Co., St. Louis, Mo., was elected president of the company, succeeding his father, the late A. H. Handlan.

Obituary

Arthur H. Johnson, formerly signal and telegraph superintendent of the London & Southwestern Railway of England and well known in America, died in England on January 23. Jesse H. Snell, district assistant signal supervisor on the Mohawk division of the New York Central, died at his home in Canastota, N. Y., on November 29.

Charles B. Schoenmehl, president and treasurer of the Waterbury Battery Company and for many years prominent in the signal profession, died at his home in Waterbury, Conn., on February 14. E. E. Hudson, who for the last twenty years has been a man of prominence in the signal field, died at his home in Maplewood, N. J., on June 27. Mr. Hudson had been elected president and treasurer of the Waterbury Battery Company after the death of Mr. Schoenmehl.

George Bryant, president of the Bryant Manufacturing Co., died at his home in Highland Park, Ill., on April 25. Willard L. Candee, president of the Okonite Company, Passaic, N. J., died on April 24 at New York City. Will H. Bloss, manager steam railroad sales, Ohio Brass Company, died at his home in Mansfield, O., June 22. Albert Taylor, manager of the North Atlantic district of the Electric Storage Battery Company, died on July 6.

Francis Bacon Crocker, noted electrical engineer and one of the founders of the Crocker-Wheeler Company and also the School of Electrical Engineering at Columbia University, died in New York City on July 9. Henry J. Kimman, manager of the Cleveland plant of the Chicago Pneumatic Tool Company, died at Cleveland, Ohio, on September 7. Charles W. Davis, vice-president and general sales manager of the Standard Underground Cable Company, died in New York on September 11. James F. Hays, sales engineer of the Union Switch & Signal Company, died at Los Gatos, Cal., on July 23.

L. A. Downs, vice-president and general manager of the Central of Georgia, and chairman of Division IV of the American Railway Association, has been appointed a delegate of that association to attend the Congress of the International Railway Association at Rome, Italy, in April next.