RAILROAD GAZETTE

FRIDAY, JULY 26, 1895.

CONTENTS

Contributions.

The Ideal Electric Supply Station.

BOSTON, July 23, 1895.

TO THE EDITOR OF THE RAILROAD GAZETTE:

A correction is necessary in next to the last paragraph of the article you published over my signature in the issue of July 19th. You make me say:

"The ideal arrangement for an electrical supply station would seem to be a generating plant of the most economical type, supplemented by a storage battery of sufficient size to carry that part of the load which exceeds the capacity of the station during all the hours such extra demand exists, and absorbing, during the hours when the outside load is light, the surplus which the plant can furnish, *supplemented by a small amount of low cost machinery for the maximum demand during the heaviest portion of the day.*"

The italicized part should be omitted from this paragraph, and inserted in a new one following that just referred to, and reading as follows:

"An alternative plan would be a generating plant of the sort mentioned above for somewhat more than the average load during the working hours, supplemented by a small amount of low cost machinery for the maximum demand during the heaviest portion of the day."

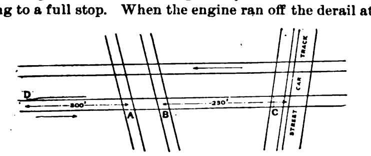
GEORGE W. BLODGETT.

Derailing Switches Dangerously Located.

Lake Shore & Mich. Southern Ry.,
TOLEDO, O., July 16, 1895.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In one of your recent numbers you make mention of a discussion on safe speeds over interlockings. In the light of some recent derailments in this region, I should say that the safe speed over an interlocking is that which will insure the stoppage of a derailed train before it reaches the crossing. That speed is certainly very much slower than much of the present practice. Very recently at Del Rey crossing, near Detroit, a freight train ran off an open derail, reached the crossing and tore up the first crossing; the engine jumped onto the track at the second crossing and ran four car lengths beyond it before coming to a full stop. When the engine ran off the derail at



D it broke the fastenings of the point rail, splices and all, and threw it out, then tore up most of the guard rail and when it reached the railroad crossing at *A* the wheels on the left side were more than half way over to the next track, clear off the ties and the engine ready to topple over. It struck crossing *A* and tore it up, then jumped back onto the rails at the second cross track, *B*, and when it stopped the pilot was at the street crossing *C*. When the derail was clear out of the way the cars had their choice of going off or jumping the gap and staying on. They ran about half and half in that respect; about half the wheels being on and half off when the train came to a stop.

The engineer claims he was going little, if any, over 10 miles an hour and that the reverse lever was over and brake on from the time he dropped off at the derail till he stopped.

It seems to me that the old standard of 300 ft. from crossing for derail is entirely insufficient. With the increased speed common since the introduction of interlockings and the increased safeguards to prevent a derailed engine from at once tipping over, we have virtually lost all the protection that should be afforded the opposing road. I feel quite certain that in a vast majority of the cases a derailed train at even moderate speed would reach the crossing, especially heavy freight trains with little or no air on the train. I suppose that little or nothing will be done, however, till some terrible accident rouses both railroad officials and state commissioners to a realization that some radical change is needed to preserve the protection supposed to be secured by interlocking.

SIGNAL INSPECTOR.

Mr. Aspinall on Express Speeds.

Lehigh Valley Railroad System,
SOUTH PLAINFIELD, N. J., July 19, 1895.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Has Mr. Aspinall been correctly reported in your issue of July 12, page 460: "If a train running at 60 miles an hour has lost a minute it must run 15 miles at 70 miles an hour to make up that minute"? If a train scheduled to run at 60 miles an hour runs

46¼ miles in	47¼ min.—1 min. lost	
15 " at 70 miles an hour	12¾ "	
61¼ miles.	60 min.	

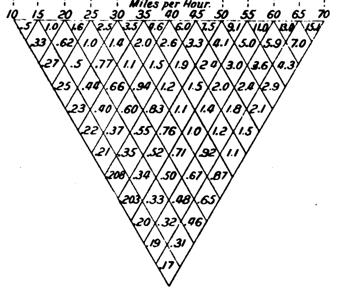
To make up the lost minute only 6 miles at 70 miles per hour would have to be run:

54 miles made in	53 min.—1 min. lost	
6 " " at 1⅙ miles per min.	7 "	
60 miles made in	60 min.	

If Mr. Aspinall meant a minute lost by a detention causing a stop of one minute he is certainly correct, for in such a case more than another minute is lost in slowing down and regaining the speed of 60 miles per hour.

L. E. MOLINEUX.

[We regret that Mr. Aspinall was *not* correctly reported, and are obliged to our correspondent for calling attention to the fact. Mr. Aspinall said, "If a train running 65 miles an hour has lost a minute, it has to run 15 miles at 70 miles an hour to make up that minute," not 60 miles an hour, as we made him say. Mr. Aspinall gets the distance from Ivatt's speed diagram, which we reproduce here. At 65 miles an hour one mile is made in 0.923 minute; at 70 miles, one mile is made in 0.857 minute. At the 70-mile gait, therefore, we gain 0.066 of a minute in each mile run, and to gain the lost minute we must run 15.1 miles. It will be seen from the diagram that if a minute had been lost on a 60-mile schedule it could be picked up in a 7 miles run at 70 miles an hour; but Mr. Molineux makes it up in 6 minutes. In fact, he, too, has made a mistake as well as the editor or proofreader, who misquoted Mr. Aspinall. In his demonstration, he says, "54 miles made in 53 minutes, 1 minute lost." Obviously it is 1 minute gained. Using his method, we have 53 miles made in 54 minutes plus 7 miles at 1⅙ per minute, 6 minutes = 60 miles made in 60 minutes. Probably Mr. Molineux transposed his miles and minutes in copying.—EDITOR RAILROAD GAZETTE.]



The table shows the distance in which one minute will be made or lost by an increase or decrease of five miles an hour in the average speed. Suppose the average speed required is 20 miles an hour, and the speed is increased to 25 miles an hour, one minute will be made up in every 1.6 miles run. From 20 to 30 miles an hour, one minute will be made up in every mile run. Take the extreme case, if the average speed is 10 miles an hour, and this be increased to 70, one minute will be made up in every .17 miles run.

Advantages and Disadvantages of Lock and Block Apparatus.

"The Advantages and Disadvantages of Lock and Block on a Busy Railroad" is the title of a brief paper presented to the International Railway Congress at London this year by Mr. H. Raynar Wilson, Signaling Assistant to the Engineer of the Lancashire & Yorkshire Railway. It appears as a postcript in the pamphlet containing the paper by Mr. A. M. Thompson, which was given in the *Railroad Gazette* of July 19. Mr. Wilson refers to 13 collisions described in the Government reports which would have been prevented by a suitable electrically locked system of block signaling apparatus. These collisions were at Colwick, Jan. 2, 1890; Gorgie, Nov. 11, 1890; Primrose Hill, Nov. 13, 1890; Wortley, Dec. 24, 1890; Vauxhall, Jan. 5, 1891; Dalry, April 30, 1891; Norwood-Fork Junction, Dec. 17, 1891; St. John's Wood, June 4, 1892; Bishopsgate, June 14, 1892; Kentish Town, Oct. 31, 1892; Thirsk, Nov. 2, 1892; Philips Park, Dec. 8, 1892; Chequerbent, Jan. 20, 1895. In addition to these, Mr. Wilson mentions the collision at Norton Fitzwarren, Nov. 11, 1890, "which could have been avoided by the use of a perfect lock and block." Evidently, he believes that the other collisions could have been prevented by something less than perfect. The paper then continues:

Most installations provide for the train securing own protection, or at least removing the protection, on its arrival at the next cabin. This is done by means of a rail contact which comes into play on the train passing over it, and releases a lock on the signal in the rear cabin.

A recent design is a combination of such an arrangement with automatic interlocking attached to the levers, working the signals, a signal being given for every operation, and before any movement can be made, a signal has to be lowered, and the movement of this signal frees the line the signal leads from and locks the line it leads to.

Another design dispenses with treadles and is arranged that when the starting signal is put to danger it locks itself until the signalman in advance frees it. This arrangement has added to it the principle of automatic locking applied to signals for every operation.

There is no doubt that these two latter installations are more advanced than the others, though neither of them would have met the mishap at Chequerbent which is quoted by the Board of Trade. This would only have been met by another system recently revived which provides treadles for all operations in such a manner that a train by the act of going shrough a cross-over road releases the one line and locks the other, by the act of going into a siding frees the main line, and by the act of leaving the siding locks the main line.

But notwithstanding all this advancement we are met with this difficulty, that the pulling off a disc for part of a train to go from say the up line to an up siding, would, on the disc being put to danger free the up line although part of the train still stood on the up line, and the same remark applies to the treadle arrangement which on being depressed by the train entering the siding would free the up line with part of the train standing on it.

Again there is difficulty that will have to be faced and that is the question of slip coaches and trains divided in the section. This no doubt is having attention from electrical engineers some of whom have brought forward ideas to meet the difficulty, but so far the means provided are permissive and not compulsory.

In those systems where provision is not made for trains shunted from one main line to another or into a siding, something has to be done to free the line where a train has been removed. In most of the cases a key is provided for this purpose which as a rule, can only be obtained by some extra trouble, the idea being that the improper use of the key is thus safeguarded against.

To avoid the improper use of the means of release, in some cases the arrangements for clearing the line are in the hands of the station staff as well as the signalman, but it is easy to understand that the platform staff might clear the line too soon or perhaps not clear it at all.

In order to properly protect a train that has gone into the next section, it is necessary that the advance signal at the cabin in the rear should be locked at danger. This is done in some cases automatically by the train itself, which going over a treadle, releases the arm which flies to danger and which cannot be lowered until the train has arrived at the cabin in advance. This idea is very good and meets the difficulties of the case. There are, however, objections which though small, remove a good deal of the advantages of the arrangement.

For instance, the last paragraph of No. 154 of the Clearing-house rules and regulations provides that when a home signal has been lowered for a train it must not be put to danger until the last vehicle of the train has passed it. This means that the automatic arrangement should be placed a train's length in advance of the home signal. The importance of this is manifest. Were the treadle under a train's length it would be possible for the signal to be placed at danger with part of the train unprotected, and again, it is desirable that the rear guard of the train should himself see the signal whether "on" or "off," but this he often could not do if the signal were at danger when he reached it.

But it is easy to understand a short goods train stopping properly inside the home signal and duly protected; and yet because it does not reach the treadle the line cannot be cleared for a second goods train to be accepted under the "warning arrangement."

But one of the principal objections to lock and block, and where it applies more particularly to the Lancashire & Yorkshire Railway, lies in the fact that if laid down as now arranged the use of short block sections is rendered futile.

Of the 855 block cabins on the Lancashire & Yorkshire line (521¾ miles = 840 km. long and averaging one cabin to every 1,400 yds. = 1,200 m.) 111 are under a full train's length (440 yds. = 402 m.) from the cabin in the rear.

There are 63 cases of such sections standing alone, eight cases where there are two short sections together, four cases of three, one of four, two of five, and one case of six continuous short sections.

The Lancashire & Yorkshire block regulations say that in such short sections "Line Clear" may be given and the "Be Ready" signal accepted for a train, providing the previous train is under cover of the home signal for the box in advance.

It has been pointed out that the treadle which releases the cabin in the rear should be a train's length in advance of the home signal, which means in short sections that the treadle is in the next section. Now the treadles should be so arranged that the first wheel should not release the locking or it will be released a train's length too soon, but the last wheel should perform the duty. This may be done by making the treadle in bar form, and the length of the longest wheel base; but this means that in the case of a short section the train would be clear of the rear section, but as some part of it would be standing on the treadle, line clear could not be given.

In conclusion, it is but right that testimony should be borne to the excellent results already achieved by engineers in overcoming so many of the innumerable difficulties of lock and block, also to the large number of mishaps that must have been avoided on lines where lock and block is in use.

Track Elevation in Chicago.

The Chicago & Northwestern Railway has begun elevating the tracks of the Galena Division, as was mentioned in the *Railroad Gazette* of April 26, and through the courtesy of Mr. Louis H. Evans, Division Engineer, we are enabled to give herewith plans and a description of the works.

The part of the track to be elevated begins 1,080 ft. east of Sacramento avenue and extends 2,045 ft. west of West Fortieth street, being almost two miles in length. From Sacramento to Kedzie avenues there are six tracks, there being seven across Sacramento avenue, one of which is a stub, ending a short distance to the west of that street. There are but five across Kedzie street, the sixth uniting with the adjacent one just before the street crossing is reached. From Kedzie avenue to West Fortieth street there are five tracks, but a short distance before the latter street is reached four more branch out, making nine tracks at the crossing. At this point the West Chicago shops of the Chicago & Northwestern are situated. Along this stretch of tracks there are six crossings that the railroad company have agreed to provide with subways, the one at Sacramento avenue already having a subway, built in 1893. There is to be 13.6 ft. head room under each subway and the slope of each street approach to the horizontal portion beneath the tracks is to be 3.5 ft. in 100.

As there is considerable travel over each of the streets, which are spaced from 660 to 1,315 ft. apart, it was necessary that the crossings should not be obstructed for any length of time, and also it was important that no delay should occur in the traffic of the railroad. To overcome these difficulties was an engineering problem requiring considerable skill, and its solution was effected in a novel and ingenious manner. It was decided to have the spans at the various streets made up of plate girders, of which 44 are required, six for each of the crossings, except that at West Fortieth street, where the main tracks require 14 girders. These are shipped to the railroad shops at West Fortieth street, and there put together in pairs on flat cars, the floors in position, and the rails in After that, blocking by 12-in. pieces will be used until the tracks are brought to their final elevation.

As soon as the girders are first in position the excavation for the streets may be started and can continue uninterruptedly until completed. The following table gives the data concerning the elevation of the tracks and depression of the streets:

Street.	Depression, feet.	Elevation of tracks, feet.	Length of horizontal roadway beneath the tracks, feet.	Length of inclines, feet.
West Fortieth	6.1	8.5	306	175
Hamlin Ave	3.22	11.4	120	92
Central Park Boulevard	2.34	12.26	120	115
St. Louis Ave	3.18	11.59	150	91
Homan Ave	3.50	11.3	149.72	100
Kedzie Ave	3.82	10.69	130	110
Sacramento Ave	....	3.88		

At Sacramento avenue the roadway of the present subway will have to be raised as much as the tracks are.

The work has been began at Sacramento avenue, and will be carried westward, the roadbed of the tracks between subways being filled in with sand until the final elevation is reached, when gravel ballast will be used. The method of filling is also one of the novel features, and the plan to be followed does away with the necessity for putting the whole stretch of track in such a condition as to cause trains to be run slowly over it. This is shown in Fig. 6, in which the lower full line indicates the present location of the track; the upper full line, the track when elevated to its final position, and the in-

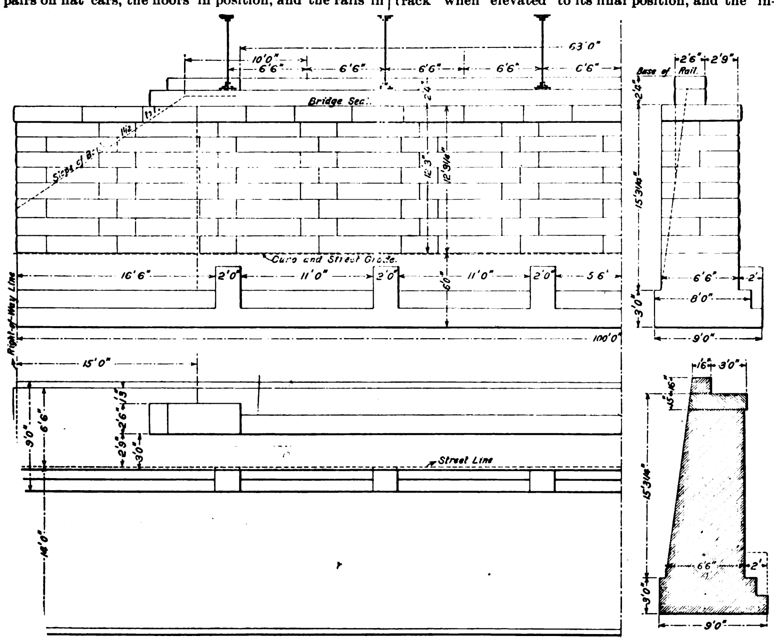


Fig. 12.—Homan Avenue Subway—Chicago Track Elevation

They are then run out into position. Before this four piles are driven at the end of each pair s to a sufficient depth to carry the weight of rains and the girders. These piles will be and bound together by three-inch planks, as Fig. 1. Resting on top of each two of these be two 15-in. I beams, 11 ft. long, bolted to three ¾ in. bolts, and having a ¾ in. saddle over the flanges of the beams. This forms place for the girders. These piles are to form the girders until the abutments are com- he top of the saddle plates will be5 ft. 6 in. esent position of the tracks.

piling is completed the girders on the cars to position (see Figs. 2 and 3), one pair at a ree of the cars by jacks and lowered on to The cars will be then pulled out and the ted for this first temporary position. No tracks are to be loaded at the same time, e and the middle one to be first finished. the other two tracks in service. Outside o be put 3-inch planks, shown in Fig. 4, its built between the piles, the object of to prevent the filling from interfering y construction. By referring to Fig. 4 at a space of 9 ft. is left between the hich affords ample room for the ma- carried on. As this progresses the supporting I-beams will be raised by me, the first step up permitting the in. timbers, Fig. 5, which take the anks and firmly bind the piling to- ch will be further assisted by a cross excavation is made for the streets termediate broken lines, the different positions of the track during the progress of the elevation. As has been said before, the work was begun at the eastern end. The viaduct at Sacremento avenue was jacked up while the larger triangle numbered 1 was filled in. Then after the smaller triangle 1 is filled in, the girders for the Kedzie avenue viaduct are to be put in their temporary position and the triangles numbered 2 are filled in. After filling in 3 and 4, the Homan avenue viaduct girders will be placed and 5, 5 filled in. This method is to be followed throughout the entire length, the consecutive numbered spaces being filled in in order. The interlocking plants at Sacramento Avenue and West Fortieth street are electro-pneumatic, which simplifies the work at these points, it only being necessary to make the air connection with rubber hose and pipe in order to keep the plant in operation. This, of course, is of great assistance in the handling of the trains. After the completion of the work, the switches to the main lines at these two points will be removed and the interlocking plants taken out.

The railroad right of way between Sacramento and Kedzie avenues is 100 ft. wide, which will permit the placing of seven tracks instead of six, as are now in use. A retaining wall will be built along the north side of this space, as is shown in Fig. 7, which also shows the abutments at the streets. Should it be necessary to build the seventh track, a similar wall will be built along the southern line of the right of way.

Plate girders will be used for all the viaducts, as has been said, the cross-sections of the different subways being shown in Figs. 8, 9, 10 and 11. It will be seen from these figures that at Kedzie, Homan and St. Louis avenues, the bridges consist of one span extending over both the street and sidewalks; at Central Park boulevard there is a row of columns placed in the street between the drive and tramways, necessitating two spans; at Hamlin avenue and West Fortieth street there are two rows of columns on the curb lines with a long span over each street and shorter ones over the sidewalks.

The abutments are of similar construction, the one at Homan avenue, Fig. 12, being taken as an example for illustration. There is a 6-ft. foundation of concrete resting on the subsoil of blue clay, which is very solid and dry. Above this foundation there are three 18-in. courses of stone, then three 16-in. courses, on top of which are two 15-in. courses, surmounted by a final 15-in. course which forms the bridge seat. All the abutments are limestone cut to size at the quarry. The dotted lines on the sides show the sand filling in the rear of the abutment.

There is nothing of special importance in the girder construction except the end bearings, which consist of two castings at each end, the upper one being concave and the lower convex. The bearing surfaces are machine-finished. At one end roller bearings are provided to allow for expansion and contraction. These girders are all at right angles to the abutments except at West Fortieth street, as shown in Fig. 3.

The construction of the floors, which is shown in section very imperfectly in Fig. 4, is worthy of attention. The floor beams, consisting of two 10-in. channels, separated by 7/16-in. filler plates, extending to within 12 in. of the ends, are spaced 4 ft. 6 in. between centers, which is the shortest distance between the axles of the company's standard locomotives. The fillers, being of exactly the same thickness as the gusset plates on the girder, permit these beams to be lowered into position from the top and fastened to the gusset plates. This is done by nine ⅞-in. rivets at each end. On the top and bottom of each beam are ¾-in. × 8-in. plates, and 7/16-in deck plates rest on the top. Between each beam are four 6 × 12-in. oak stringers to carry the rails, two being placed in conjunction for each guard rail and rail. These are carried by 3 × 3-in. angles, which are riveted to the webs of the floor beams and support the ends of the stringers. A further stiffening of the stringers is secured by a 7/16-in bottom plate and two 6-in Z bars, for each pair of stringers, the whole forming a trough which rests on the end angles. The Z bars are riveted both to the bottom plate below the stringers and to the deck plate, which is also fastened to the girders and gusset plates by 2 × 2-in. angles, and stiffened longitudinally by similar angles in the center between the guard rails and at the sides near the gusset plates. The depth of this floor is about 1 ft. and weight 550 lbs. per ft.

The rails are placed on tie plates, the centers of the rails being exactly over the joint between the stringers. They are secured to the stringers by bolts passing through stringer and bottom plate for the inside flange and lag screws for the outside. Between the heads of the guard rail and main rail is a distance of 7 in., the guard rail being held on the inside by cast-iron clips riveted to the deck plate, and on the outside by lag screws to the stringers. An 80 lb. rail is used.

Further information upon this subject may be obtained by reference to the *Railroad Gazette* for July 28 and December 1, 1893, and March 30 and October 19, 1894.

The Literary Product of the International Engineering Congress of 1893.*

The writer desires to present some notes regarding the publication of the proceedings of the International Engineering Congress, held in Chicago in 1893. . . . For the benefit of all interested, the writer, who had much to do with the preparations for the Congress, will put on record some facts which may not have been published. . . .

The question arose early among those who were managing the work, both in Chicago and elsewhere, of what should be done if the Worlds Congress Auxiliary should fail to make its promise good to provide the means for conducting the Congresses and printing their Proceedings. After some correspondence and conference the opinion became general that the arrangements for the Engineering Congress should include that of publishing, so that if the Auxiliary should fail the valuable results of our Congress would not go into pigeon holes or packing boxes.

The United States Congress refused utterly to expend a dollar in printing the Proceedings of the Congresses. The Engineers were thus thrown back upon their own resources. It is, however, an Engineer's business to be always resourceful and there could be no exception to the rule now. It was arranged, it had been already, that the Proceedings of the Divisions of Civil, Mechanical, Mining and Metallurgical Engineering should be printed by the three national societies and that the newly formed Societies of Engineering Education, the outgrowth of the Congress, should print the Proceeding of that Division; but the Naval and Military Divisions conducted by Commodore Melville and by Major Clifton Comly, respectively, found themselves with no financial assistance whatever. Commodore Melville at one time seriously considered the idea of appealing to the great ship building concerns of the country, but a wiser course was found by printing the Proceedings through the publishing house of John Wiley & Sons of New York. So valuable were

*Extracts from a paper presented by Mr. E. L. Corthell at the Convention of the American Society of Civil Engineers, June 1895.