

The Importance of Curve Lubrication, Their Installation and Maintenance

Report of Committee

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The excessive wear on outer rails of sharp curves and on the flanges of engines and cars has been recognized as an expensive maintenance item since the earlier days of the railroads. Probably the first action that was taken to reduce this abnormal wear was to have the track walker carry a daub or stick and a pail of grease and manually grease the gage side of the rail where excessive wear was occurring. Numerous homemade devices have been used over the years to try to achieve the desired results and are partly responsible for the development of our present-day automatic lubricators. The first lubricators on the market were the engine installed flange lubricators. The first automatic track-installed lubricator appeared on the market in 1926. Since this time numerous lubricators have made their appearance and vast improvements in the design and materials used have resulted.

Effect of Diesel Power

The advent of the diesel locomotive has greatly increased the interest of maintenance men on proper track lubrication due to the increasing amount of rail wear caused by wheel flanges. The increase is due, in part, to the four-wheel trucks of the diesel locomotive where the lead wheel of each truck crowds the outer rail, causing severe abrasion, while the trailing wheel will be $\frac{3}{4}$ in. to 1 in. away from the rail. This increase is also due, in part, to the increased speed of diesel-powered trains in former slow-speed areas; as on ascending grades, preceding and leaving sharp curves, as well as other reduced-speed zones, and near station stops.

The four-wheel trucks of cars have the same guiding characteristics as those of the four-wheel diesel truck but have less angulation of the leading wheel flange against the high rail because of the shorter wheel base of the car trucks. Recent tests have shown that more abrasion will occur under each diesel unit than will occur under each heavily loaded car in a train on a sharp curve without any lubrication. Further tests conducted on the same curve with lubricators in service showed that the rail and wheels were quite effectively protected from abrasion.

It is estimated by various members of the committee, representing 22 railroads in different parts of the country, that the life of the outer rails of curves, if properly lubricated, can be extended from 25 per cent to 300 per cent of their life without lubrication. The difference in these percentages are controlled by other factors; namely, degree of curve, speed, tonnage, super-elevation, etc. It is our general opinion that savings may be realized by lubricating the outer rails of all curves of 2 deg. or over. Some of the committee expressed the opinion that savings can be realized by lubricating curves of 1 deg. 30 min. and even 1 deg. curves in high speed territories.

With the present cost of rail and labor it is possible, in many instances, to realize enough savings on the rail alone to pay for the necessary lubricators within the first year after their installation. This is especially true if lubricators are so placed as to protect new rail. These savings can nearly be realized when the curve-worn outer rail is set down to the inner rail of the curve and a No. 1 secondhand rail is laid on the outer rail. In addition, there are other very material savings that can be counted by the proper lubrication of curves. These are: Labor and tie savings by obviating the necessity of numerous re-gagings of track as head of outer rail is abraded without lubrication, and the excessive wear of flanges on engines and cars that occurs on curves not properly lubricated.

Lubricators in Yards

It is our opinion that lubricators used in yards will effect savings whenever there are ladder-track turnouts terminating in active trackage in which considerable expense is encountered in maintaining the points and turnouts due to excessive abrasion of the switch points, curved leads and frogs. It will generally be found that more actual savings per lubricator installed can be realized in busy yards than on the average main track with moderate curves due to the high cost of switch points and their short normal life without lubrication. It is estimated by members of this committee that switch points properly lubricated on a heavy switching lead will extend the life of some switch points, especially those on the turnout side of the switch, from double their normal life to as much as four to six times their normal life without lubrication.

There is considerable difference of opinion of members of this committee relative to this advisability of placing lubricators in yards where sanding may occur. Some contend that sand, spilling onto and mixing with the lubricant, will turn the lubricant into an abrasive and aggravate the rail-wear condition where sanding is heavy. On the other hand, many others point to the fact that sand does not cling to the sides of the rails and the only grease that becomes fouled with sand is the small amount which is already extruded and standing on the grease-distributing bars of the machine at the moment the sanding unit passes over it. However, numerous tests have been made and large savings realized by the use of lubricators in yards where excessive abrasion of switch points and rail is occurring.

It is the opinion of most of this committee that the use of lubricators, either track installed or engine installed, will reduce the number of derailments, due to flanges of engines or cars climbing the outer rail of curves or switch points on tight curves or sharp turnouts, by the lubricant materially reducing the friction between the wheel flange and gage side of rail.

Effect on Tractive Effort

It is the unanimous opinion of the committee that the tractive effort of engines is not adversely affected by lubricators, provided they are properly installed and maintained, as the lubricant is applied either directly to the flange of the engine wheels, or, in the track installed, to the gage side of the rail-not to tread of wheel or top of rail. It has been found that some driver slippage that occurs can be traced to drippings from journal boxes finding its way to the rim of the wheel due to centrifugal force and onto the tread of the wheel where it is deposited on the head of the rail.

Curvature as well as grades determine the maximum allowable tonnage that may be handled with a given type of power. Ordinarily where heavy curvature exists, sharp grades will also be encountered. Lubricators will decrease the friction that is encountered on the curves and will allow increased tonnage per train to be handled. Tests have been conducted at various times in the past several years that indicated more cars could be hauled over grades, with heavy curvature, if the proper lubrication of rail was obtained.

There are two types of lubricators on the market today-the track lubricator and the engine flange lubricator. It is the opinion of this committee that the most benefits will be realized from the track lubricator, mainly because the lubricant on engines is applied to the rail by the engine wheels only whereas every wheel in the train will spread the lubricant on the gage side of the rail with the track lubricators. It is the opinion of some of our committee, who have terminal territories, that a combination of the two types is very beneficial in yards. The engine flange lubricator would help to protect isolated industry switches and curves and protect the flanges of the engine while the track lubricators would be used on the heavy switching leads where many cars move over a switch to only a few engines.

Proper Installation Necessary

The proper location and installation of the track lubricator is of prime importance if the maximum benefits of the machine are to be realized. Very careful consideration should be given to the manufacturer's recommendation as to location of the lubricator as this depends upon the particular lubricator involved, their capacity, type, etc. In general in continuous curve territory, lubricators should be installed at intervals of lire-decided cumulative central angle of curvature, depending upon the capacity of the particular lubricator involved and with the local conditions of traffic, speed, gradient, etc., taken into account. Installation with respect to proximity to the nearest curve also depends on the particular machine. Some lubricators are designed to be installed in the tangents ahead of the curves and some are preferably located at the beginning of the curve.

Care should be exercised in choosing location of lubricator in yards with flat switching where heavy sanding occurs. The lubricators should not be placed where heavy switching of cars is the practice. It is better to choose a location ahead of the switching point where sanding is not a problem. All cars passing over the lubricator can then be well greased and carry grease to the switches. In this way excessive maintenance charges will be eliminated and heavy grease will not be found where the engines do the heavy sanding.

Should Study Needs

Many railroads have conducted a re-study of their existing lubricators due to dieselization, to determine if they are receiving the maximum benefits from their present investment. It has been indicated that some lubricators have been relocated due to this study and more complete lubrication achieved without additional capital expenditure.

It is our opinion that such a study should be made of existing lubricators before purchasing additional machines. In addition, this study should indicate locations, not at present lubricated, where abrasion of wheel flanges with the rail is resulting in excessive wear of the rail and switch points and argument presented for purpose of additional lubricators where legitimate savings can be shown justifying the expenditure.

In conducting this study, it is important to choose the kind of lubricator that will best fit your needs; taking into consideration the size of the supply tank, simplicity of working parts, etc., to avoid expensive maintenance of the machines. The curves on the territory to be lubricated should be listed showing right-hand curves in one column and left-hand curves in another and indicating degree of each curve, length and per cent of grade and the actual mileage from one end of the territory to the other; also the severeness of the abrasion that is occurring on each curve. From this information you can figure the cumulative degree-feet of curve to be protected on each rail. The next item to show is density and type of traffic - high-speed passenger, high-speed passenger and freight, heavy tonnage freight, etc. After the above information has been compiled the manufacturer of the lubricator you have chosen should be contacted for his recommendations as to the number of machines needed and the best locations for them. A field trip over the territory involved should then be made to determine if the locations selected are correct. It is often found, when the location is made entirely in the office, that a slight change could be made in the location of some of the lubricators to better fit the actual physical conditions and still obtain the desired results.

It is important that the lubricator be properly installed as specified by the manufacturer so that it will give the best service with the lowest possible maintenance. The proper maintenance of the lubricator is of prime importance if the maximum benefits are to be realized. Here again, the manufacturer will supply printed information on his machine and will help instruct those who are responsible for the maintenance of the machine in the best possible methods of caring for it. It is also very important that the proper lubricant be used. It is the

opinion of this committee that the best lubricant to protect the rail and wheel flanges is a paste lubricant containing a certain percentage of powdered graphite and which is effective throughout the entire range of summer and winter temperatures.

It is believed by some members of this committee that one man should maintain the lubricators on an entire district; while others feel that the section foreman should maintain the lubricators on his section. All agree, however, that whoever maintains the lubricator should be under the direct supervision of the roadmaster.

After the lubricators have been in service for some time, another field survey should be made to verify that lubricators are properly placed and functioning to fully protect the rail as was planned, or if additional lubricators are needed.

We feel that the actual annual percentage savings per dollar expended to be realized by proper lubrication of the rail, when excessive abrasion is occurring, is large enough to be attractive to the management of our railroads if the needs are properly calculated and presented to them for their consideration.

It is our opinion that proper lubrication is important enough to every maintenance officer to see that a thorough study is made of existing lubricators to be sure they are giving the maximum benefits and to present the necessary arguments for the purchase of additional lubricators actually needed; as this will release the money, that is now spent on expensive re-gaging and/or relaying of rail because of excessive abrasion of outer rail of curves and switch points, for other maintenance work.

DISCUSSION

Vice-President Dunn: Thank you, Mr. Counter, for a very fine report. I am sure that the information contained in this report will be of interest to every man in this room. I am sure also that there are probably some controversial questions the report will raise and we welcome at this time your comments and your questions in regard to the report.

Lubricants in Snow Territory

R. W. Putnam (S.P.): Mr. Chairman, there was nothing said in the report about the use of the oilers in snow territory. On our railroad, we have hundreds of them in snow territory. We are a very firm believer in the lubricators and in the maintenance of them, but we have a great deal of difficulty in maintaining them in wintertime while operating snow equipment, particularly spreaders. The question has often been brought up whether we wouldn't be better off by removing the lubricators in these territories in the wintertime. Some claim the snow itself is a lubricator. Possibly we would save money by taking them off. We damage quite a lot of them, but we are still persistent in keeping them operating during winter. Has anybody anything along that line to offer?

Vice-President Dunn: In developing this report, did you have situations of that sort?

Chairman Counter: No, that point wasn't brought out by any member of the committee. There was an indication from one railroad that they had the same trouble you mention, but I couldn't develop enough information on it to get it into the report.

Of course, you will receive some lubrication from the snow, that's quite true, and I imagine you would have trouble operating spreaders unless you marked the location of each lubricator with some kind of post.

Mr. Putnam: That is done, but sometimes in snow storms they are overlooked.

H. W. Kellogg (C.& O.): Mr. Chairman, we have quite a number of lubricators on our lines up in northern Michigan, where we have quite a bit of snow. As you say, we have our signs up, so when we are operating the snow plow we lift the flangers the same as for any crossing. We don't operate spreaders too much on lines where we have lubricators, although occasionally we do, and we go through the same procedure.

Special Instructions Are Issued

Now, on the responsibility for making certain these lubricators are always in operation: In the past year or so we found quite a few lubricators that weren't operating, so we set up sort of a system and issued instructions as to the inspection and maintenance of these lubricators. The lubricator itself is directly the responsibility of the foreman on that section. He is under the supervision of the track supervisor who now is to make at least a monthly inspection of each lubricator and make certain it is in operation. The general track supervisor has to make an inspection of every lubricator at least every three months, and oftener if he thinks it necessary on his territory.

The maintenance of this equipment, the mechanical maintenance, is done now by the maintenance-of-way equipment department. If the lubricators need extra parts or some work done on them in the shop, they are sent to the maintenance-of-way shop for this work. That has helped out quite a bit in relieving the section foreman of the responsibility of getting parts and putting them in, and so far we have had pretty good luck with this kind of system.

R. A. Gravelle (G.T.W.): Mr. Kellogg, do you install these lubricators on certain curves? What is your minimum on that? Does your length have anything to do with that?

Installed Where Rail Is Wearing

Mr. Kellogg: Well, the length of curve doesn't usually have anything to do with it. It is usually where we notice the high rail is wearing considerably. It may be a three or four-degree curve. We have a few of them on some two-degree curves. We have a lot of three-degree curves that don't have lubricators, and some that do have them. We have installed them on the basis of conditions, and since we have the diesel power we have installed a lot more. We have installed some, using the smaller type of lubricator, in switching leads and yards.

Mr. Gravelle: You find they are effective in yards?

Mr. Kellogg: Yes, but the thing is to keep them working. You can put a lot of them in, but if you don't have a system of inspection and maintenance, there is no use spending a lot of money for them.

Reduction of Wheel Wear

Member: A considerable amount of study has been made in the savings accruing from reduction in the wear of rail, but I wonder if any figures are available as to the savings realized in the reduction of wear on locomotive wheels and car wheels, too.

Chairman Counter: I don't know of any such study. I have tried to bring that into my arguments when I wanted additional lubricators, and I have never been able to arrive at a formula as to how much savings there are. I know there are some, but with our pool service, operating practically over the whole railroad, it's kind of hard to figure how much savings you are going to get on any one engine.

Vice-President Dunn: Is Mr. Neal of the Southern Pacific in the audience? As I understand it, he has a very mountainous, curving railroad.

C. E. Neal (S.P.): Mr. Chairman, we have a great many lubricators on our railroad, as Mr. Putnam said a moment ago, and the maintenance has always been a terrific problem. The foremen don't like to stop and fool with them, and they really give a lot of trouble. We have recently tried out a little system of having one of our mechanics install them and assist in the maintenance of them, and that seems to be the answer to it. I think any practical track man will know the advantages to be gained from lubricating a rail, and if you can work out a system where you don't have to tie up a gang to keep these maintained, I think you will all get more lubricators and get a great deal more out of them.

Now, some of our roadmasters are more inclined to take care of the machines than others. We recently had one young fellow who got tired of changing wiping bars on a certain type of lubricator, so he moved it over to the lower side of the curve to keep the wheels from rubbing the bars too much. (Laughter)

Well, I laughed, too. I didn't think it would work. The blades are lasting about four times as long, and he is doing a better job of lubricating the curve. He didn't put it on the low side of the curve clear inside, but on the beginning, and it is working. I thought it was funny at first, but it isn't when you see it in action.

On statistics, you talked about locomotives. I am on a little portion of the Southern Pacific along the west coast, and this little railroad I'm on now has a good many 15-deg. curves on three per cent grades. There was a feeling at one time that you couldn't use a lubricator on a single-track railroad on that type of terrain, but it isn't true. They can be used very successfully, and since the advent of the diesel and incidentally there is a lot of distortion of your rail where they are using dynamic braking on these heavy grades - the curve lubricator does come into the picture a great deal more not only in saving of rail, alignment, gage, maintenance, but also in the maintenance of your locomotives.

Now, they have developed many fine lubricators; for locomotives recently, some that are actuated by gears, others by the movement of the trucks, and we have found on our railroad that we have extended the life of the turning of the wheels a period of at least twice on locomotives so equipped with these lubricators.

Both Rail and Wheel Oilers Needed

There is quite a bit of argument as to whether you should have a track lubricator or an engine lubricator. I am a believer that you should have both. I think that lubricators are a fine thing, but the problem seems to be, as Mr. Kellogg puts it, not only inspecting them but keeping them working. If you are trying to do it with a foreman and a section gang now, I don't believe it will be very successful. Somebody has got to take them under their wing and really make them work, or they are useless to you.

G. M. O'Rourke (I.C.): Mr. Chairman, it may sound strange to hear someone from a prairie railroad talking about lubricators; on sharp curves and their maintenance. The maintenance problem seems to be disturbing most people, and I thought you might be interested in knowing what we are doing on one of the few divisions of the Illinois Central where we do have some curves up to four and five degrees. That is in southern Illinois, through the foothills of the Ozark mountains that extend into Illinois, through Kentucky, from Arkansas and Missouri.

One Man Maintains Lubricators

On that division we have assigned one man with a motor car and a helper, and he does an excellent job of maintaining the lubricators on that division. The chief engineer of the Maintenance Equipment Corporation has said on more than one occasion that the best maintained lubricators in the United States are on that division of the Illinois Central. If he is here, I'd like to have him stand and tell me whether I heard him correctly when he made that statement.

P. J. Wolf (Mtce. Equip. Co.): I can verify that, Mr. O'Rourke.

Mr. O'Rourke: Thank you. But that is the method we have, and it has been so successful over several years that I would like to suggest it to anybody who is having that problem. Now, this man we chose was somewhat higher in rank than section foreman. He had been a section foreman and showed an interest in lubricators, so the division engineer put him in charge of all lubricators on the division. He gave him a better wage than a foreman gets to encourage him to stay on the job, and he has been on it several years. He is very proud of the results of his work, and he likes to have everybody know he has well-maintained lubricators. There is no problem there, and they are being maintained very economically.

J. J. O'Keefe (S.P.): Mr. Chairman, over in the Sierra Nevada Mountains, we have several lubricators. We have appointed one man to take care of them and we have no trouble there at all. So if you have one man to take care of them, I think that is the answer to the problem.

Chairman COUNTER: Well, I think it is fine if you have enough lubricators to occupy one man's time. In a short enough territory, they can cover it. But if you have maybe 20 or 30 lubricators scattered over a great deal of track, you have a hard time appointing one man to that.

Vice-President Dunn: Mr. O'Rourke, I judge that the man on the Illinois Central, the St. Louis Division, has that as a full-time job.

Mr. O'Rourke: Yes, and it so happens the St. Louis Division can be covered by this man on a motor car. The headquarters is in the middle and the lines of the division radiate from it in all directions. He goes out on one part of the railroad one day, and on another part another day. We have the assistant to the division engineer here, Dick Birkett, and perhaps he can tell us some of the details.

R. B. Birkett (I.C.): This particular man was made an extra gang foreman, and it was necessary for us to do that for labor reasons, because his work was formerly assigned to section laborers. Most of these lubricators are south of Carbondale, a distance of 60 miles, and he makes a round trip twice a week down there. He covers all the rest on the division, which are very scattered, the division going about 100 miles in all directions, and I believe he uses a pickup truck which the company rents by the mile, to cover these other lubricators.

Vice-President Dunn: Thank you. That would probably be a very efficient and good way of maintaining lubricators, assuming the geography is right.

Mr. Birkett: In South Carbondale, there are no roads that are close to the lubricators, close to the track, because of very rocky territory. He uses the motor car there. Of course, the other parts of the division he can reach with a pickup truck.

Can Welders Maintain Lubricators?

H. J. Williams (C.N.R.): Has there been any thought of turning the care of these lubricators over to the division helper and welder who travel over that division? Those boys are probably a little more mechanically inclined and could make repairs on them.

Chairman Counter: Nobody counted on having welders take care of them. On our road, we keep our welders welding, and they have a full-time job there without bringing in anything else. I believe the one man assignment is the best way to get your maintenance reduced if you have lubricators in a small territory that one man can cover.

Mr. Williams: What I was referring to was the idea of keeping them in repair, not the idea of filling them with grease, etc. The section crew can maintain the required grease, but when the yearly inspection is to be made, your welders in passing over this territory could look over these lubricators and report as to why they weren't working.

Chairman Counter: About 50 per cent of the committee recommended and indicated they were using one man to maintain a certain number of lubricators. He was either a mechanic by trade or he learned it. With the rest of them, I think each individual section force was taking care of the machine on their section.

Number Maintained by One Man

G. T. Summitt (Cotton Belt): Was there any decision reached as to how many lubricators one man might maintain?

Chairman Counter: No, there wasn't any comment in our report as to how many one man could maintain. I think there would be a limit to what one man could do, I see your point, but there was no specific amount. Maybe the Illinois Central can tell us how many they have down there.

Mr. Birkett: I think there are about 150.

Chairman Counter: And he is a full-time, five day employee.

Mr. Birkett: He hits every lubricator at least once a week.

Chairman Counter: Does he fill the grease pots?

Mr. Birkett: He carries the grease with him and keeps them full. Nobody else touches them.

T. J. Vansandt (S.P.): I don't believe your report indicated how much coverage you get out of one machine.

Distance Covered by One Unit

Chairman Counter: There are so many factors involved you can't say how far any one lubricator of any type will go. There is the territory to be protected, the degree of curve, the super elevation on curve, and the type of traffic you have over that track. There are just so many factors, as indicated in the report, that you have to get them all summed up before you can say how many lubricators you need to protect any one territory.

Mr. Vansandt: I might add that we reclaim all our parts. They are shipped in to the store, worked over by our shops, and returned to the field for replacement. Anything that can be reclaimed is salvaged by our shop forces, such as bearings, etc.

If you want to know how far they cover, you can ask Mr. Putnam here. He made quite a study of the coverage on these machines.

Mr. Putnam: I don't know whether I can add anything or not, but several years ago I did make quite a study of them. I kept track of the contour of the rail on eight-degree curves where the lubricators were not used, and where they were used, and definitely established the amount of wear. It finally developed that in that territory, which was a 1.8 per cent grade 40 miles long having eight-degree curves, one lubricator would cover about 4,000 feet of those eight-degree curves up the hill and about 2,000 down the hill. In other words, one lubricator would lubricate almost 6,000 feet of curve. We have on that hill probably 100 lubricators or more on that 40 miles of track. But 4,000 feet is just about what they do cover, and that is what we have in there now.

Chairman Counter: I have seen instances where on some installations we have we protected other curves we weren't even planning on as much as eight or ten miles away from it.

Vice-President Dunn: Mr. Putnam, in developing this data you spoke of in regard to the distance the lubricant is effective, did you also develop data that indicated the increased rail life due to these lubricators? Have you any information in that regard?

Rail Life Is Extended

Mr. Putnam: Well, I did at the time, but I've forgotten what it was. It was something like 40 per cent anyway. In that territory at the time we were changing curves about every two years, some at 18 months, and the increased life of the eight-degree curve was about a year. That is quite a saving.

Chairman Counter: Some indicated in their answers to the questionnaire we sent out that, as you say, where they were laying rail every three months they extended that to well over a year in some instances, so your savings would be tremendous in that kind of curve territory.

G. W. Hanson (N.P.): I come from the Rocky Mountain Division of the Northern Pacific, out of Butte, Montana. In this territory our track is on a two per cent compensated grade. In a stretch of about 20 miles, we have 18 lubricators. I was wondering if the Southern Pacific in its mountain operations noticed any slippage of tonnage trains, especially after rain or wet snow. We have noticed it considerably on our stretch during wet weather, the train slipping down.

Enginemen Disliked Lubricators

Mr. Putnam: There was some trouble of that kind, yes, but it has gradually been eliminated through better maintenance of the lubricators. These have to be maintained so that the grease doesn't get on top of the rail, and it is also very desirable that you don't have one across from the other at the same place. There were a number of things like that that had to be overcome. Hogheads complained about it quite a little bit, and the first thing they would do was squirt a lot of sand on the lubricators. It took quite a few years to overcome all of that.

Chairman Counter: I think it is absolutely right that proper maintenance of the machine will eliminate much of the complaint. I know in one instance, when we were installing lubricators, we told enginemen what they

were. Well, everybody had trouble for a while. We installed another shortly after that, and didn't tell any of the enginemen about it, and nobody had any trouble there.

Uses Guard Rail Lubricators

E. V. Grogan (N.Y.C.): I want to tell you of a little different type of lubricator than was mentioned here this morning. In Grand Central Station, we have two sets of loop tracks, one on the upper level and one on the lower level. The curvature on those tracks is from 17 deg. 30 min. to 33 deg., and they are protected by guard rails. Previous to 1951, we used to grease these guard rails by hand. It was a difficult problem, and we were continuously getting complaints from the operating people and our own people about the noise the trains were making going around there. Incidentally, we turn about 275 trains there in 24 hours, and it was very difficult to get that long equipment around without a lot of noise.

We went to one of the companies we had purchased lubricators from, and told them they had to design a guard rail lubricator for us. They did that. We could not put the tank down in the ground, so they designed a lubricator for use with the tank above ground. It works on the guard rail and works with a plunger, the same principal of all rail lubricators.

We installed one of these lubricators in 1951, and we immediately stopped the hand greasing. We were so pleased with it that we purchased three more. We have two on the upper level and two on the lower level. Now, they went far beyond our expectations, because they were not only getting the guard rail on the loop tracks lubricated, but the guard rails throughout the entire Grand Central area. Now, as I think you all understand, this grease goes on the opposite side of the wheel of the gauge, and I think anywhere where you have guard rails on sharp curves or in heavily used terminals, they are certainly very well worthwhile. I understand now the subways are also going to this type of lubricator for guard rails.

Chairman Counter: Thank you. That wasn't brought out by anybody on the committee. We all know we do have trouble with guard rails in some of our heavy switching terminals, and the guard rails have to be replaced.

Vice-President Dunn: I see Mr. Ed Weiss in the audience, and I know he has some heavy grades and excessive curvature between Corbin and Knoxville. Perhaps he would tell us what he does.

E. Weiss (L.& N.): Well, we have three different machines. Where there are just a few of them and pretty well scattered, we let the section man look after them, but where there are a number of them, we do like Mr. O'Rourke described on his railroad. We found out the best way to do is to have one man look after them for repair parts and for maintenance. Where the section foreman looks after them, we don't have much luck.

Vice-President Dunn: Are there any other questions or comments in regard to this report?

If not, Mr. Counter, you and your committee are excused, with the thanks of the Association for a splendid job.