

work, finds that he is getting such good results from this particular machine that he just hates to let such a good producer go. But it must be done if this lad is to have his fair chance of training and another to have his chance. Therefore, the necessity of a chart showing the progress of the lad through the department, the time he was at each class of work, and his percentage of marks for progress made during the time he worked on each class or division of machines on which he was employed. These charts, I would say, by the way, should follow the lad from his first start until he becomes a journeyman, when a certified copy of same should be handed to him.

After passing through the machine shop, I would then send the lad to the fitting bench, there to be thoroughly instructed and practised in the arts of chipping and filing, for I consider nothing else is of so much importance to a mechanic as to be able to use his hammer, chisel and file well—an accomplishment which, in these days of air hammers and accurate milling machines, I am afraid is very apt to become obsolete in our large workshops. Of course you must not imagine that I am not aware of the value and profit to the shop in the use of the above-mentioned tools. At present, however, I am talking of the making of the mechanic and not of the making of money. We all assume that when the mechanic is made he represents a good investment, which he surely does, if not to the company which trained him, at least to the country at large.

We must always keep in mind that it is the man of hands and head that we want as a mechanic. The head without the hands is of little value, and while the pneumatic tools and accurate machines are what we want, and must have, to run the shop, still I have seen more time wasted waiting to get a hammer, or the hose, or perhaps to hunt up a special chisel, than would have done the work two or three times over by hand. The same applies to taking a job back to the machine shop to have it eased a bit, while a man who can use a file well would have it finished and up into place in the time that was consumed in carrying it out and back. It is a bit like the Mexican who will spend half an hour to catch a pony to ride half a mile.

During his progress through the fitting shop the lad gets a good insight into the motion work, air brakes, tool-room practice; and a particularly useful school is a spell with the millwrights, after which he may be handed over to the erecting shop foreman as a good, useful member of his staff to complete his time. With regard to patternmakers' apprentices, I would have them serve at least one year in the foundry.

So much for the mechanical part of the training. Let us now look at the theoretical side, where there is room for a great diversity of opinion. With the G.T.R. Co., the first thing a would-be apprentice is required to do is to show that he is physically and mentally equipped, the former being decided by the company's medical officer, while the latter is attended to by an examination held in the master mechanic's office. This examination is usually conducted by the chief clerk, and consists of reading and writing, also a few examples from the first three rules in arithmetic. Having satisfactorily passed these tests, he is eligible for a probationary term of one month in the shops, after which he is indentured as an apprentice. In this indenture he agrees "to attend such classes for instruction in mechanical drawing and practical mechanics as the company may arrange for." These classes have been very successful indeed, and the development of the boys, from year to year, is most satisfactory. The company has been most happy in its choice of instructors, the results obtained being ample evidence

of this. The classes extend from Oct. to April inclusive, two per week of two hours each—one in mechanical drawing, the other in practical mechanics. Both are carried out under lines and from books prepared by the company's Chief Draughtsman at Montreal. For the drawing classes, the boys are provided with drawing board and T and set squares. The class of work is very carefully graded according to the year of the apprentice, and the same with the practical mechanics. The first year boys, commencing at addition, proceed by easy stages as far as square root, the second year, in addition, taking levers, pulleys, uniform motion, and centrifugal force. Third and fourth year students take extra work to the extent of a thorough grounding in work and horsepower, whilst the fifth, or last year apprentices' studies include properties of metals and a general lot of problems on useful subjects. You will thus see that when a lad has taken in the whole course properly he has got a first-class groundwork, supposing he wishes to qualify himself for the higher positions. At the termination of each year of the lad's time, he goes up for an examination in mechanical drawing and the theory of shop tools and practice. After passing this, he receives his advance in pay. In this examination, the first, second, and third year boys draw from small blue prints, making their drawings either to a full or half size scale as may be required, while the fourth and fifth years are required to sketch from the part of an engine which is brought in from the shop for the purpose, and then lay it down to scale with all the necessary dimensions on. In every instance the drawing is inked in and fully finished. The marks for this examination are divided into three equal divisions: drawing, theory, and practical or shop work. The two former are awarded by the examiner, and the latter by the foreman under whom the lad is working at the time. By these means a fair average of the boy's ability and industry is arrived at.

The system is working very well, and the company is very liberal in its prizes to the most proficient in each year at each centre where the classes are held. At the close of the term, when the examinations are all finished, the boys gaining the highest percentage of marks in each centre are brought together at one point and compete for the company's system prizes of \$25 for each subject. By this means a good, healthy rivalry is set up between not only the boys individually as classmates, but also between them and their teachers as representing one centre against the system at large. This gives an added interest to the examinations.

There is still a side of the apprentice question which is not to my idea sufficiently taken care of. His work hours are well looked after and his play hours partially. I expect to be considered Utopian in my ideas, but I am sure that we have always a larger percentage than we give credit for of seriously minded and smart lads who would, if they had the opportunity, make very extensive use in their spare time of what I might term an experimental workshop or laboratory, fitted with several small machines, forge, etc., in which they could try out their many ideas. Which of us has not had the idea at one time or another that he would be another Stephenson if he only had the opportunity to work out his ideas? But it is only given to very few lads to possess even a lathe of his own, and, assuming he has one, he is groping along in the dark, and just for want of a little guidance here or there finds himself at a standstill, and eventually throws the thing up in disgust and drops off into idle habits. Now, if this experimental workshop were placed at the disposal of such for one or one and a half hours two or three nights a week, under the care of a capable instructor—who would also re-

quire to be a man of tact and patience—I am sure we would foster the taste for the work to a high extent. I would provide the boy with the raw material at cost price, and have him make his design first, and submit what he proposed to make to the instructor, who, on examining it, would be able to point out the weak spots to the lad or help him over any difficulties in his design. This would teach the lad how to use his brains in designing work and make him much more useful in the shops in the way of reading and understanding any drawings he might be called upon to work from. The opportunity to do drawing alone would be of no use unless he could manufacture the model and see it going for himself, because he would not be quite satisfied that what was told him was right until he had encountered the practical difficulties in the making. Besides this he would be able to gratify his desire to make things in a legitimate way, instead of, as we all have seen, dodging the foreman whilst doing a bit of private work, which he has to smuggle out of the gate under his coat, and feel mean and lose his self-respect in so doing.

The foregoing paper was written for presentation before the Canadian Railway Club.

Duluth, South Shore and Atlantic Ry.

The report for the year ended June 30, shows the following results, as compared with those of the previous year:

Railway operations:	1910.	1909.
Operating revenue	\$3,302,147.03	\$2,719,337.86
Operating expenses	2,269,247.84	1,979,518.07
Net oper. rev'e.	\$1,032,899.19	\$ 739,819.79
Outside operations:		
Revenue	69,942.62	66,248.97
Expenses	61,351.79	58,382.76
Net revenue	\$ 8,590.83	\$ 7,866.21
Total net revenue	\$1,041,490.02	\$ 747,686.00
Taxes accrued	225,917.63	203,599.70
Operating income	\$ 815,572.39	\$ 544,086.30
Other income	61,322.44	146,208.67
Gross income	\$ 876,894.83	\$ 690,294.97
Int. on bonds	\$ 876,219.17	\$ 862,805.00
Other deductions	352,390.62	28,936.81
Total deductions	\$1,228,609.79	\$ 891,741.81
Net loss	\$ 351,714.96	\$ 201,446.84

The general balance sheet shows assets of \$49,270,144.66, and liabilities of \$52,880,840.84. The charges to additions and betterments during the year were \$381,401.12, including additions to rolling stock, which covered three locomotives, 400 box cars, 310 ore cars, five charcoal cars, two cabooses, one boarding car, and air brake equipment. The rolling stock owned by the company includes 85 locomotives, 65 passenger cars, 3,092 freight cars, and 93 miscellaneous cars. The company, which is controlled by the C.P.R., owns 517.44 miles of main line, 67.54 miles of branch lines, and has trackage rights over 20.83 miles of other companies' lines.

There were 3,695,469 tons of freight carried during the year, with an average of \$3,546.91 per mile of road, and \$1,965.9 per train mile, and 719,169 passengers were carried, with an average of \$1,850.65 per mile of road, and \$1,225.18 per train mile.

The first locomotive taken by the C.P.R. to Winnipeg—the Countess of Dufferin—now restored to its original condition, has been placed on a pedestal in the William Whyte park, opposite the C.P.R. station on Higgins Ave., Winnipeg. An illustration, and some notes as to the history of the locomotive have already appeared in our columns. A tablet is to be affixed to the pedestal and it suggested that the names of the crew of the first train be recorded on it. They are Geo. Lindoff, engineer; Harry Redpath, fireman; Jas. Doig, conductor; Jas. Trotten, assistant conductor; Robt. Kirkuff and Wm. Thorton, brakemen. The latter is the only one now resident in Winnipeg.