causes was that the joints were too open; the more opening you have at the joint no doubt the harder stroke you get. Rails flatten down worse at the ends in winter than in summer, & I know no reason except that the joints are more open in the winter than in the warm weather. The rail is certainly not any softer. I think you will all agree with me that that is about the way it is. I am not in a position to tell you any methodical way of bringing about an improvement so that it will be perfect at all. It is a class of work that is pretty hard to get just right, & it is not hard to make a table to go by, almost anybody could do that; I think I could make a table myself, giving the figures, temperature, etc., but it is a great deal more difficult to get your rails down in accordance with that table, whatever it may be.

T. Hickey.—I would like to ask Mr. Drinkwater if he couples them together before he puts them in.

J. Drinkwater.—I generally do.

T. Hickey—How long a stretch?

J. Drinkwater.—It depends a good deal on where we are working & how the train service is, etc. I generally try to put in a quarter of a mile, very often put in half a mile without a break.

T. Hickey.—In using the expansion shims I have just spoken of, I think if the rail is properly laid there cannot be any mistake made as to the amount of expansion. Our practice is that we lay one rail at a time, & the foreman who does the work carries with him a thermometer, he does not carry it in his pocket, either. He changes his shims according to the temperature, laying on a rail at a time; so that the cold snaps do not affect your rail where it is laid in that way as though you put up a string of half a mile or three-quarters of a mile in the morning & put it in at noon.

J. Drinkwater.—I may say that we have been using thermometers, but in any rails I have laid we have always coupled them together in strings varying from 10 rods to a mile. I have put in a mile of branch rail where there was not much traffic. We have never laid any with one rail at a time as Mr. Hickey speaks of.

The Chairman.—I think the proper way to lay new rails is to lay one rail at a time. That is the way I have adopted of late years.

J. Drinkwater.—I don't see how that overcomes the difficulty. You must have an opening at one end of the rail, & you have a new rail at one end of it & either a gap or an old one at the other end. The temperature does not stop while you place that rail in position & fix it there, it keeps going up all the time or going down. If you tighten up your bolts, any joint fastening I have ever seen grasps it tight enough to carry the rail along. A joint fastening that wont do that is not very much good, to my mind. I cannot see where laying one rail at a time will get over the difficulty, unless you leave your fish plates off or not tighten your bolts.

J. Graham.—In the last three years we have re-laid about 60 miles of 72 & 73 lbs.—about 20 miles 73 & the balance 72. The way we do, we link up half a mile or a mile, just according to what time we have between trains. I use oak shims for expansion, & leave them in, don't take them out; 3-16 is the size I use. Last year in Nov. I relaid about 8 miles. This spring when it got warm we had to cut 30 inches out of 4 miles. When the bolts were in it would only allow 3-16 of an inch expansion. I am certain if we had not cut the rails in May or June that they would have kicked in that 8 miles laid in Nov. This summer I laid about 13 or 14 miles in Aug. of 73 lb. steel. I think one has to be very careful about the expansion. I find that the rails are liable to buckle, which I think is just about as bad as having them pound a little on the ends.

The Chairman.—I would like to ask Mr. Hickey if he considers there is any difference in expansion between the different weights of rails.

T. Hickey.—No, I don't think there is enough to make a difference. There may be a very slight difference, but it is a hard matter to get at & to get at accurately. I have made some tests in that direction with a light section of rail & also a heavier one, & I was unable to detect any difference. I might, however, have gone into it more thoroughly, but my time was limited. It would require a great deal of time & a great deal of care to get at the difference, if there is any. The difference is so slight that I don't think we should make any mention of it. I would like to say a word as to using wooden shims. I used them some 16 or 20 years ago. Where you use oak shims they turn the rail ends & bunt up the rail you set them in, leaving very little expansion. I found I had some trouble with the wooden shims & discontinued using them.

J. Graham.—I think it depends a good deal on the foreman who is laying the steel, how the wooden shims act—if he makes his men be careful when they are fitting the rails together, all right. I suppose if he is careless & lets them come back with the other rails as hard as they wish the wooden shims will not amount to much.

T. Hickey.—In regard to that, as I understand it, the wooden shims are used for a given expansion, which has to be allowed between one rail & another, & that opening is filled with hardwood. I don't understand just how that opening is allowed for expansion if there is a hard piece of wood in there.

It was decided to postpone the further discussion of the report.

PLACING OF TIES AND TRIMMING BALLAST.

E. Murphy, Roadmaster C.P.R., Woodstock, Ont., Chairman of the Committee, reported as follows. Thirty-foot rails should have ties uniformly spaced as follows:

70 lbs. a yard or lighter,	18 ties
70 to 80 " "	16 "
80 to 100" "	14 "

Ties in main side tracks should be 24 in. centres, & in other than main side tracks 30 in. centres. In reference to trimming ballast I cannot give a better idea than to consult the C.P.R. standard. I have had my ballast for the past 16 years trimmed according to our present standard, & have found a great benefit from it. We all agree that the quicker we can get the water from the roadbed the better it is for the road.

The adoption of the report having been moved it was discussed:—

J. Drinkwater.—I have an idea that probably Mr. Hickey would like to have something to say regarding this report. Although he has moved the adoption of it, I don't know whether he had anything to do with getting it up or not. Mr. Murphy sent it to me, & there may be things in the report that Mr. Hickey is not just in sympathy with. I got up with the intention of trying to make it clear for him to have something to say if he wished. There are things in it that I am not altogether in sympathy with. I have never had a track where the ties were too close together, not if we could equalize the spaces or distances. I have seen one rail with 18 or 19 ties under it & the next one to it with 11. I don't like them that way, no matter what the weight of the rail is. This report gives a 70 lb. rail & lighter, 18 ties. I think if the different weights of rail for the main line had been left out & 18 ties mentioned it would have been something near it, with the class of ties we use on our road. We get them all the way from 7 in. face to 14, or somewhere near there, & it is rather a difficult matter to get them spaced & have an equal bearing & an equalized support under the rail. I find in looking round that a great many roads have fallen into the idea, & adopted it, of having ties cut to a certain dimension. This way they can be equally spaced & the bearing & support of the rail thoroughly equalized. The same number of ties then would be under each rail of a corresponding length, & the space, whether spaced from centre to centre, or spaced between bearings, would be all the same. This summer we started spacing our ties—hewn ties & sawn—varying