

apart, divisional depots were organized, with engine sheds, coal yards and shunting grounds, and at every alternate division repairing shops for the engines and cars were fitted up with the best machinery. The telegraph line was built simultaneously with the track-laying, and every night the wires were connected with a temporary office at the end of the track, and placed in communication with Winnipeg, about 150 men being employed on this service.

After the tracklayers came the surfacing gang. After the rails were laid these men immediately lifted the track, lined the rails and packed the sleepers with the material of the embankments. The beams outside the ends of the ties were then taken off, and the material was thrown in between the rails to a height of two inches above the ties, forming a regular convex surface, which soon hardens with the sun and sheds the water perfectly. By this means the necessity for ballasting is not pressing, and none was put in in 1882 or within 12 months after the rails were laid, and the surface of the sub-grade is in a better condition for the ballast than without this preparation. 150 men were employed on this surfacing, and their advance gang was kept close to the track-layers, so that immediately after the rails were laid the trains could run 25 or 30 miles an hour without any damage to the rails; the line had a good surface, and the absence of ballast was no detriment.

In addressing a British Association, it may not be amiss to call attention for a moment to the relative merits of the Canadian Pacific over other trans-continental railways in its commercial and political aspects. Our line is, from ocean to ocean, in round numbers, 400 miles less than the rival route from San Francisco to New York. In alignment, curvature, and every other engineering question, it is a superior line, and can be proved more economical per mile. It has nothing like the amount of capital involved, and both mechanically and financially it has advantages that are not discounted or offset by any inferiority in any respect to its Southern rival. It passes over a summit 3,000 feet lower, and has not to contend with any serious climatic difficulties, such as experience shows are a heavy drawback on the Central Pacific. Montreal is nearer to England than New York in summer by 200 miles, and the Canadian Pacific terminus is 400 miles nearer than San Francisco to any of the important Asiatic ports. There is a saving of 1000 miles from Japan or China to Europe by the Canadian route, and nothing to offset this disadvantage of the American system. There is no mysterious difficulty in explaining this. The one line follows pretty nearly the line of the 41° parallel of latitude, the other averages about 50°, the length of a degree, is about 8 miles shorter on the Canadian line (so that the further the journey is continued, the greater absolute saving in distance will be shown). But Montreal is closed by the ice in winter, and Canadian traffic must seek a more eastern port and betake itself to one of the Nova Scotian harbors, which, like New York, are open throughout the year. From Louisburg, our most eastern harbour, to the Pacific, will be about 3,600 miles, or 300 miles longer than from New York to the Pacific. Louisburg is 750 nautical miles nearer to England than New York, and, taking 15 knots per hour as the fastest winter speed that we may look for on the Atlantic, and 30 miles per

hour for railways, there is a saving of 40 hours, either winter or summer, between England and the Pacific by our Canadian route. The saving on the Pacific is quite as much. The great Japan current sweeping to the north is deflected by the shape of the coast of the north Pacific, and a vessel from China and Japan to take advantage of this would follow very nearly the same track, whether she were bound to British Columbia or San Francisco, 700 miles to the south.

Allowing that there is not the same advantage going in the other direction, there is still over 400 miles, and the total saving in time at the speed estimated would make about 72 hours, or three full days, as the same time by the Canadian Pacific. As if to mark this as the future route of commerce, nature has placed at either end of this route, in Nova Scotia and Vancouver Island, such immense stores of coal, that whatever may be the anxiety in England on the subject of their mineral deposit of fuel, there need be no apprehension on that head at either end of the Canadian Pacific. The only coal deposits on salt water that are comparable in price and quality to these Canadian deposits, are the Australian coal fields of Sydney, and it is somewhat remarkable, that, in circum-navigating the globe after passing these last, no other available coal seams would be encountered until England would be again reached. As long as cheap coal is the basis of economical navigation, the line that passes these coal fields would seem to be the one that possesses the greatest advantages between England and the East. If coal is the oxygen of commercial activity, that, in its turn, is the spring of individual and collective wealth, of political importance, of natural prosperity. It is in the hope and under the belief that this Pacific Railway is destined to be one of the principal factors in the future progress and development of this country that it has enlisted the sympathy of the great majority of the Canadian people, and it is the pledge given by its rapid progress and energetic management that has lifted it out of the position of a local or sectional enterprise and made it of Dominion and national importance. As England is mistress of the seas, and as this is the most complete and convenient inter-oceanic link between the Atlantic and Pacific, Canada trusts to see her great railway the main highway between Great Britain and all her Asiatic and Australian dependencies.

LUMINOUS PAINT.—Luminous paint continues to make slow but steady progress in its application to innumerable useful purposes. Among its most recent applications may be mentioned tapes for field use at night by the Royal Engineers department. Starting from a given point towards the front the men leave a trail of luminous tape on their track, and on reaching a given point they mark the contour of the earthworks to be executed by the same means, paying out the tape as they return towards the camp. The working party then follow the outward trail, execute the work, and return to camp without having discovered a single ray of light to the enemy. The German War Office authorities have experimented with the paint for purposes of night attack, and Lieutenant Deppe, of the Belgian School of Gunnery, is investigating its merits in the same direction. Our own Government are also using painted framed glasses, or Alladin's lamps, as they are called, for internal boiler inspections. General Lord Wolseley also took with him a luminous compass for the Nile expedition. It has also been applied in some large establishments to the fire buckets, which are thus easily found in the dark. The latest application of luminous paint is that of a South-Eastern Railway third-class carriage, the interior of which has been lined with the paint on he back of glass.