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## AMERICAN PERMANENT WAY.

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The word "American" covers a very wide field, including not only Canada and the United States, but the whole continent; a vast extent of country with all varying conditions of climate, of constructive material, and of railway requirements.

When therefore American Permanent Way comes to be considered, the subject must necessarily involve a considerable variety of constructions, depending upon location and other conditions. Thus the form of construction required for a railroad in the Northern United States or in Canada, built to resist the severe winters of these latitudes, might be unnecessarily expensive for the mild climate of the south; also roads with heavy traffic require a more solid and substantial construction than those having only a light service; then again, the materials of construction available in places geographically far apart are often very different, and the engineer must adapt himself to circumstances, using what materials he can best obtain at a reasonable cost.

Permanent Way, or Railway Superstructure, as it is sometimes called, is that portion of a railway which directly receives the weight of the moving trains and transmits it to the road bed

below. It comprises the rails, the cross ties or sleepers to which these are attached, and the distributing material in which the ties or sleepers are bedded. The object of the Permanent Way, no matter how constructed, is in all cases the same; to provide a way for the running equipment of the road to move upon, and to so transmit and distribute the weight from this to the sub-structure, that the latter, which is usually a soft material, as earth, may be able to sustain the load without settlement.

American Permanent Way only differs from that of other countries, in the adaptation of the materials available for the construction of the work, taking into consideration their relative abundance and value, and displaying, perhaps, some of the aptness for which Americans have a reputation.

It is necessary for a first-class perfect track to have good surface, good drainage, true line, accurate gauge and tight joints.

Rails have been made of wood, iron and steel. Wood is so soft a substance and so perishable, that it can only be employed for very light and temporary service, such as is sometimes required in lumber regions. It has been so employed, and may be considered as essentially "American." Iron and steel are the materials used throughout the world for railway service proper, and the cost of steel in late years has so nearly approached that of iron, that with its vastly superior qualities it is rapidly driving iron out of use; in fact the use of iron may already be said to be of the past. The shape and weight of the rail is governed by several conditions. Its section must be so formed at the top as to properly carry the wheels of the moving load with the least amount of wear, and at the bottom so that it may be securely attached to the supports upon which it rests, at the same time transmitting the load effectively to them. It must be designed with the greatest possible economy in weight, to carry