

any one master controller desired. When this is done, current having been turned on to these bus wires from some one of the master controllers, all the various main controllers move, and obviously simultaneously, assuming different positions according to which of these bus wires be energized, and in doing so they in turn connect the motors into series or parallel, similarly to the hand-operated apparatus. It will thus be seen that any number of motors, mounted on various cars, can be simultaneously varied in speed by the operation of any one small master controller.

There are three systems now on the market, the Sprague, Westinghouse, and General Electric. The Sprague Company use a main controller, modelled somewhat after those built for hand operation, replacing the motor-man's handle by a small motor. The Westinghouse Company use an air cylinder, with a pinion and rack, in place of this small motor, controlling the admission of air to the cylinder, and thus the movement of the piston, by electrically operated valves. The General Electric Company divide the main controller into a number of separate switches, consisting of a movable arm, on the end of which is mounted a contact, this arm being actuated by a solenoid supplied with current from the bus wires.

(To be continued in next issue.)

The Cuba Company's Railway.

By Weldon Fawcett.

The project now being carried out by Sir Wm. Van Horne and his associates for the construction of a complete railway system throughout the length of the island of Cuba constitutes one of the most interesting and most daring railway ventures which have been presented in many years. The new system will embrace, all told, some 400 miles of track between Santiago and the port of Nipe, in the province of Santa Clara, and it is claimed that in influence upon industrial, agricultural and commercial development the new transportation system will be entitled to rank with the transcontinental railways of America, the Trans-Siberian Ry. of Asia, and the Cape to Cairo Ry. of Africa.

The present railway system of Cuba is entirely inadequate in bringing the extreme ends of the island together, Santiago and Havana being as far apart, in length of time, as New York and San Francisco, though separated by a gap of little more than 300 miles. To remedy this defect is the object of the new Cuban railway, and it is doubtful if any other one enterprise will prove of such vast benefit to the island. Indeed, it is declared that no revolution could have existed in Cuba had such a railway been completed by the Spanish government. Not only will the possibility of future political turbulence be in a great measure eliminated and the entire island opened to commerce, but land now unproductive and of practically no value will be worked. Moreover, the seaport towns will experience a wonderful impetus in their trade relations, for it is proposed to construct numerous branches extending from the trunk line to the seaboard.

From the standpoint of railway interests generally, however, perhaps the most interesting phase of the Cuban railway project is found in the peculiar obstacles which it has been necessary to overcome in its construction. Sir Wm. Van Horne had already organized a company with a capital in the neighborhood of \$10,000,000 when owing to the scandals growing out of attempted "franchise grabbing" on the island the U.S. Congress passed what is known as the "Foraker Resolution" prohibiting the temporary government of Cuba from granting any rights, concessions or franchises. So

strictly was this resolution enforced that even the right to extend existing railways was refused, and it appeared at the outset as though any new enterprise which would find it necessary to use the public highways or even to cross them would be effectually blocked. However, Sir William did not propose to let his enterprise be balked, and therefore inaugurated a new method of railway building, namely, construction work without governmental sanction.

As a first step heavy purchases were made of land in the districts through which it was sought to carry the line. After the private right of way had thus been secured the line of the road was surveyed and graded and stations were erected at convenient points on the property owned by the Co. All this was in strict accordance with the rights of the corporation as a land owner, for there are over a hundred private railways on the large plantations of Cuba. Under this plan of construction no attempt was made to cross the public highways, and thus there were breaks in the railway line at every point of intersection with a public road.

Finally when the enterprise had progressed sufficiently far to afford a clear indication of its character Sir William and his associates presented the case to the Military Governor of Cuba, and he, after giving careful consideration to the matter, granted what are known as "revocable licenses" for crossing public roads which give promise that the military government will not interfere with the undertaking. Without this daring procedure the completion of the Cuban railway would assuredly have been delayed for several years. As it is the Co. has had about 3,000 men at work from the time of the commencement of active operations, employing them in grading, building bridges and track-laying, and after the harvest of the sugar crop the force was increased to upwards of 6,000 men.

The construction of the line has, because of the peculiar mountainous character of the country, presented many difficulties. Moreover, it has been necessary to devote exceptional care to the construction of bridges and tracks in order to provide against the rainy seasons of this tropical climate when water in torrents descends upon the roadbeds. The main line is between 355 and 400 miles in length, extending from Santa Clara to Santiago, and is in every respect a first-class line, equal in all respects to the average line in America. The bridges, of which there are a great number owing to the volume of water which falls in the rainy season, are of steel construction, and the rolling stock and equipment are thoroughly up to date.

It is planned to construct as feeders to the main line feeders to the north and south coasts which will reach the ports of Nipe, Gibara, Baracoa, Sancti Spiritus, Santa Cruz del Sur and Manzanillo. These branches will bring the aggregate length of the entire system to the neighborhood of 1,000 miles. The connection at the city of Santa Clara, with the western system of railways of the island, is most important, enabling a passenger to go by rail the entire length of the island, from Pinar del Rio, the capital of the westernmost province, to Santiago, the capital of the easternmost province. In this connection it may be noted that the officers of the Western Havana and Cuban Central railways, two of the most important of the existing lines on the island, have looked with such favor on the Van Horne project that they are understood to have given financial support to the new project.

As having a direct bearing upon the field in which this new railway enterprise is to operate, it may not be amiss to give a momentary glance to the public railways already in operation in Cuba. There are on the island 17 separate systems of an aggregate length of 1,225 miles, although nearly all of these lines

have their ownership vested in five companies which between them practically control the transportation situation on the island. The longest single system has a length of 417 miles. The cost of these 17 systems has been somewhat in excess of \$57,000,000, and the earnings amount to \$6,212,000. Three of the systems each show earnings in excess of \$1,000,000, and in the case of one system, the United Railways of Havana, the earnings exceed \$1,500,000.

The new Cuba Ry. is but one step in the enterprise which Sir Wm. Van Horne and his associates have evolved for the development of the natural resources of Cuba. Vast tracts of land have been purchased in the central and eastern provinces, including forests, pastures and first-class agricultural land. Upon these tracts it is proposed to establish colonies, giving the preference in every case to the best men in the construction gangs. During the construction of the roads the Van Horne syndicate has erected a number of saw mills in the timber areas for the purpose of getting out logs and lumber and ties for the use of the road, and as soon as the work of construction is completed it is proposed to turn these saw mills into private hands and organize companies to cut the timber for commercial purposes. The Van Horne Company is also encouraging immigration from Spain, the Canary Islands, Central and South American countries, and if the effect of the climate is not found to be injurious to Americans, colonies from the U.S. will be taken to Cuba. —Railway and Locomotive Engineering.

Per Diem Charges for Freight Cars.

The Secretary of the American Railway Association has issued a revised list of the railway companies on whose behalf per diem rule agreements had been signed and filed in his office up to June 30. The companies operating or controlled in Canada which have filed agreements are: Canada Atlantic, Vermont and Province Line; Canadian Pacific, Ottawa Northern and Western, Pontiac Pacific Jct.; Central Nova Scotia; Central Vermont; Dominion Atlantic; Duluth, South Shore and Atlantic; Esquimalt and Nanaimo; Grand Trunk; Cincinnati, Saginaw and Mackinaw, Detroit, Grand Haven and Milwaukee, Grand Trunk Western, Toledo, Saginaw and Muskegon; Halifax and Yarmouth; Intercolonial, Prince Edward Island; Michigan Central; Minneapolis, St. Paul and Sault Ste. Marie; New York and Ottawa, Ottawa and New York; Quebec Central; Rutland; Spokane Falls and Northern; Toronto, Hamilton and Buffalo; Wabash.

The Lake Erie and Detroit River Ry. in filing its agreement reserved the right to withdraw on giving three months' notice.

Recent British Columbia Legislation.

At the recent session of the B.C. Legislature the following acts were passed affecting transportation interests:

Amending the Vancouver and Westminster Ry. Co. Act of 1900.

Amending the Pacific, Northern and Omineca Ry. Act of 1900.

Incorporating the Victoria and Seymour Narrows Ry. Co.

To aid the construction of a railway from Victoria to the Yellowhead pass.

To aid the construction of a railway from Vancouver to Midway.

To aid the construction of a railway from Midway to Vernon.

To amend certain acts incorporating railway companies passed during 1901.

To aid the construction of a railway from Kitimaat to Hazelton.

To encourage the manufacture of steel rails in Canada.