dling of local freight and work trains; in fact, almost each and every one of the thousand and one matters that go to make up a successful operation of a division. If any one of the features named above is not functioning properly, as well as others too numerous to mention, the effect will be seen in the slowing down of the road speed or a lowering of the average mileage per serviceable locomotive or a falling off in the loading efficiency. All these must be at their highest possible levels of practical performance, and when they are a glance of the eye at the daily barometer ought to tell it, and when they are not, a few minutes' inspection of the data ought to tell why and point the remedy. The supervisors must have tracks fit for speed and service; the signal engineer must have communicating systems and signal apparatus in good working order; the road foreman must have engines properly rated and sufficient crews and supervision; the train master must have his yard and road forces properly instructed and disciplined; the division operator must have his train dispatchers and signalmen alert and intelligent; and the master mechanic must produce the power in ample quantity and fit for service. If the division superintendent can be assured that everything is being done that can be done to have every available engine in service that can be put in service, and that every engine dispatched is being loaded to the maximum number of cars it can economically haul, then he is assured of an economical performance and an avoidance of waste in the operation of locomotives and cars.

### Bids for Electrification of Brazilian Railway

The long-expected notice for sealed bids for the electrification of the Central of Brazil Railway was finally published in the Diario Official for November 27, 1921. The notice calls for proposals on the electrification of stretches of the line, the operation of traction and transport material, the construction of sub-stations, and various other improvements on this important Brazilian railway. It is quite probable, however, that a new "edital" will be issued, as strong objections have been made to some of the terms of the present one.

The proposals will be received on March 30, 1922, at 1 p. m. A bond of 200 contos is exacted to guarantee the signature of the contract. After that day and the day following a judgment of the fitness of the competitors, a day will be set for the opening of the proposals, following which a selection will be made.

Only those competitors will be considered as fit who can prove, in addition to sufficient capacity, that they have furnished and mounted large installations of electric traction, including installations for maneuvers in large railway yards. In order to guarantee the execution of the contract, the bond will be raised to 500 contos of reis.

The works relating to the suburbs of Rio de Janeiro are to be concluded within a period of two years and the other works within a period of three years, both counting from the date of registry and approved by the Tribunal de Contas.

There will be three or four substations, the first being between Mangueira and S. Francisco, the second close to Deodoro, and the third or fourth between Deodoro and Belem.

Thirty locomotives will be furnished, 10 for freight and 20 for passenger trains. For the suburbs, 66 electric cars (carros motores) will be acquired, composed of 60 first-class cars and 6 second class; 100 second-class box cars will also be purchased. For the SS and SD trains, there will be 32 electric cars (carros motores) and 48 box cars (carros reboque).

### Electrification of Railways No Panacea

The *Canadian Engineer* states that it is typical of the attitude of many persons towards the electrification of railways who have not carefully investigated the subject that with electric energy available in large quantity and reasonable price, the electrification of railways should be merely a matter of course. The experience of railway engineers and operating officials indicates that the matter is not at all so simple as it appears.

The principal reason that branch lines, lines about railway terminals and favorably situated main lines have not been generally electrified is that the original capital outlay is very large. For example, on the Chicago, Milwaukee and St. Paul which has a larger electrified mileage than any other railway in America, totaling in all 647 route miles, the cost of electrification was in the neighborhood of $28,000 per mile. This did not include the building of power houses or the development of power, as the necessary energy was purchased from a private power development company. It is the general experience that the costly improvements necessitated by electrification can only pay on lines where there is intense traffic, or where there are especially heavy grades and curves, or excessively low temperature handicapping the operation of steam locomotives, or congestion and complication such as occurs in terminals. An indication of the care with which electrification needs to be carried out in order to be commercially practicable, is seen in the fixing of the electrified zones on the C. M. & St. P. Railway. Originally, 440 miles were electrified in 1914-16, and in 1918, 209 miles were added, separated by a considerable distance where traffic conditions were more favorable and where steam operation was deemed to be more economical, although the grades and curves were comparatively heavy and electric current was as cheap as on the electrified sections. In level country the peculiar conditions that favor electrification on mountain divisions do not exist, and only in case there is intense traffic such as on the New York, New Haven and Hartford, where for 73 miles the line runs through a thickly populated district is it practicable to electrify.

Such investigations as have been suggested by the Ontario county council for railways with relatively light traffic, do not appear to promise much. If, however, the lines were treated not as steam railways operating by special electric locomotives, but as electric railways with a different class of rolling stock for passenger and light-freight traffic, more favorable results might be expected.

### The Railroad's Rate Proposal

In order that more widespread relief can be realized by the agricultural industry from a reduction on freight rates, the Interstate Commerce Commission has been asked by the Association of Railway Executives to grant the following:

"1.—A reduction for an experimental period of six months, of 10 per cent in carload rates on wheat, corn, oats, other grain, flour and meal, hay, straw and alfalfa, manufactured tobacco, cotton, cottonseed and products, except cottonseed oil and cottonseed meal, citrus fruits, other fresh fruits, potatoes, other fresh vegetables, dried fruits and vegetables, horses and mules, cattle and calves, sheep and goats, hogs, poultry, eggs, butter and cheese and wool, any reduction in such rates made since September 1, 1920, to constitute a part of this 10 per cent, it being understood that such reduction of 10 per cent shall not apply to traffic moving wholly within New England, and that if the reduction of wages and labor expenses referred to in paragraph 2 hereof is put into effect prior to the expiration of the said experimental period, this limitation of six months shall not apply to the said reduction in rates. It should be noted that the loss of revenue resulting from this reduction would all come out of the net revenues of the carriers.

"2.—The necessary steps under the law, including, in case of failure to agree in conference, an application to the United States Railroad Labor Board to be filed as promptly as possible, for a reduction in the wages of employes, with the understanding that, concurrently with such reduction in wages, the benefit of the reduction thus obtained shall, in a manner approved by the Interstate Commerce Commission, be passed on to the public in the reduction of existing railroad rates, except in so far as such reduction in rates shall have been made in the meantime."