

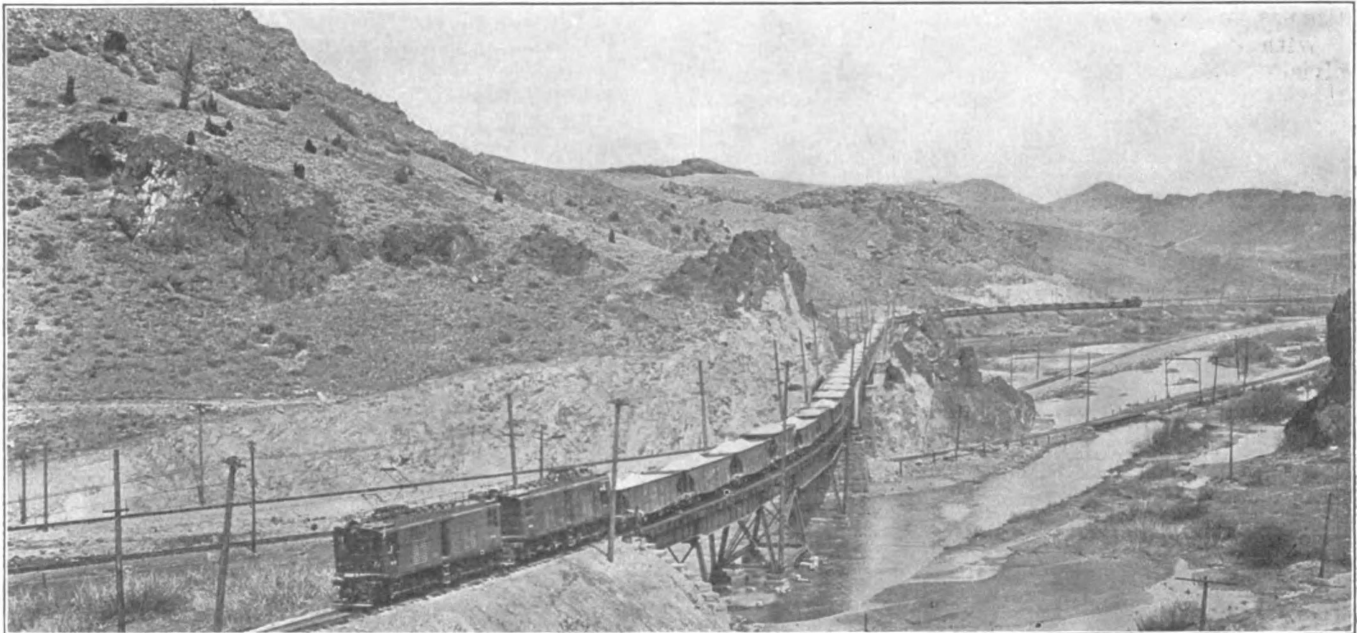
## Operating Plans for the Electrified Division of the C., M. & St. P.

**Provision for Continuous Power Supply—Twin-Conductor Trolley-Wire Suspended by Alternate Hangers from a Single Catenary—Operation of Pusher Locomotives on Down Grade**

The operating plans for the electrified division of the Chicago, Milwaukee & St. Paul Railway possess special interest, for the reason that this is the first attempt to install and operate electric locomotives on tracks extending over several engine divisions. Under these conditions it is claimed that the full advantage of electrification can be secured. Previous terminal and tunnel installations of electric operation have been made necessary, more or less, by reason of local conditions; but the electrification of this steam road has been undertaken purely on economic grounds, with the expectation that superior operating results with electric loco-

would seem, therefore, in changing from coal to electricity as a source of motive power, that the railroad is amply protected in respect to the reliability and continuity of the power supply.

The initial contract calls for nine freight locomotives and three passenger locomotives, each weighing 260 tons, and taking current from a twin-conductor trolley, composed of two No. 0000 wires suspended side by side from the same catenary by independent hangers alternately connected to each trolley wire. This form of construction permits the collection of very heavy current by reason of the twin contact of the pantograph with the two trolley wires, and also insures sparkless collection under the extremes of either heavy current at low speed or more moderate current at very high speed. It is stated that the twin-conductor type of construction is equally adapted to the heavy grades calling for the collection of very heavy currents, and on the more level portions of the profile where maximum speeds of 60 m.p.h. will be reached with the passenger



C., M. & ST. P. ELECTRIFICATION—ONE TRAIN OF SIXTY-FIVE CARS IN TRANSIT ON ELECTRIFIED BUTTE, ANACONDA. & PACIFIC RAILWAY CONNECTING WITH THE MILWAUKEE SYSTEM

motives will return an attractive percentage on the investment required.

As described in the full technical description of the electrification that was published exclusively in the *ELECTRIC RAILWAY JOURNAL* for Nov. 21, a contract has been let to the Montana Power Company for an adequate supply of energy over the 440 miles of main line considered for immediate electrification. This company has covered a great part of Montana and part of Idaho with a network of transmission lines, which are fed from several sources that provide a total developed and undeveloped capacity of 244,000 kw. The several power sites are inter-connected by transmission lines on steel towers and operating at 100,000 volts. Ample water storage capacity is provided in the Hebgen Reservoir, amounting to 300,000 acre-feet, and this is supplemented by auxiliary reservoir capacity at the several power sites, bringing the total up to 418,000 acre-feet. The Hebgen Reservoir is so located at the head waters of the Madison River that water drawn from it can supply in turn the several installations on the Madison and Missouri Rivers. Consequently the same storage capacity is used a number of times, affording an available storage capacity considerably greater than is indicated by the figures given. It

trains having a total weight of more than 1000 tons. The advantage of this type of construction is due partly to the greater surface for the collection of current, but largely to the very great flexibility of the alternately suspended trolley wires, a form of construction which eliminates any tendency to flash at the hangers either at low or high speed. Each locomotive, as stated in the above mentioned article, will be equipped with eight 430-hp General Electric motors. These will be twin-gearred to the driving axles in the same manner as on the Butte, Anaconda & Pacific, the Detroit River Tunnel and the Baltimore & Ohio locomotives, a pinion being mounted on each end of the armature shaft. The motors are of the commutating-pole type and have openings for forced ventilation from a motor-driven blower located in the cab. The freight locomotives are designed to haul a 2500-ton trailing load on all gradients up to 1 per cent at a speed of approximately 16 m.p.h., and this same train load, unbroken, will be carried over the 1.66-per cent and 2-per cent ruling grades on the west and east slopes of the Rocky Mountain Divide with the help of a second similar freight locomotive acting as pusher. Track provision is being made at Donald, the summit of the grade, so that the pusher locomotive may run around and couple to the head end

of the train to permit electric braking on the down grade. In this case the entire train will be under compression and will be held back by the two locomotives at this head end, the entire electric braking of the two locomotives being under the control of the motorman in the operating cab of the leading locomotive.

It is considered that electric braking will prove very valuable in this mountain railroading, for, in addition to providing the greatest safety in operation, it returns a considerable amount of energy to the substations and transmission system, which can be utilized by other trains needing power. In this connection, the electric locomotives will have electric braking capacity sufficient to hold back the entire train on down grade, leaving the air-brake equipment with which they are also equipped to be used only in emergency and when stopping the train. There is provided, therefore, a duplicate braking system on down grades, which should result in the greatest safety of operation and the elimination of a considerable part of the customary break-downs, wheel and truck wear and overheating, thus reducing maintenance and improving track conditions.

With the completion of the remaining engine divisions, it is proposed to take advantage of the possibilities afforded by the construction of the electric locomotive by combining the present four steam engine divisions into two locomotive divisions of approximately 220 miles length, changing crews, however, at the present division points. As the electric locomotive needs inspection only after a run of approximately 2000 miles, requires no stops for taking on coal or water, or lay-over due to dumping ashes, cleaning boilers or petty roundhouse repairs, it is expected that the greater flexibility of the locomotive so provided will result in considerable change in the method of handling trains or limited by the restrictions of the steam engine.

### Express Cars in City Service

**Rush-Hour Service in Boston and Noon-Hour Service in Schenectady Are Described**

As a means to the end of improving schedule speed on certain runs several companies have recently begun operating express cars sandwiched in between the regular local cars in city service. The Boston Elevated Railway about a year ago commenced this kind of operation in the rush hours on certain routes where the segregation of through from local traffic appeared desirable. At present the express cars are operated outward-bound in the afternoon rush hours from the rapid transit terminals at Dudley Street, Harvard Square and Sullivan Square. On the front and rear vestibules a 19-in. x 21-in. sign marked "Limited Stops" is hung as the car enters the terminal station of the rapid transit lines, announcement of the first stopping point being made by platform men, motormen and conductors. In the morning, inward-bound cars approaching junction points where inspectors are located may be run as expresses to the rapid transit terminal upon order of the inspector. In this case the limited-stop sign is taken from the inside of the vestibule and hung in position, the car number being taken by the inspector. Inward-bound limited-stop cars stop to discharge passengers between the point of departure and the rapid transit terminals, and outward-bound cars of this class stop to receive passengers between the terminal and the first scheduled stop after beginning the express run. Of seventy-five outward-bound cars that are run from Harvard Square in one afternoon rush hour, twenty-five are in limited-stop service. With this close headway it is impossible to provide gaps ahead of the express cars, but the distribution of

the traffic and the comfort of the patrons are much improved.

The Schenectady Railway Company also has inaugurated a special express service during the noon hour from the General Electric plant to the suburbs. This started with one car which was first operated for and patronized principally by the heads of the various departments in this plant. Later, it became so popular that the custom gradually extended from the heads of departments to the general office help, and at present all are enabled to go to their homes for lunch if they so desire. The company is now operating express cars on every line to the suburbs. Many of these cars do not make any stops until reaching the outlying sections, and with one exception the cars are able to reach the terminals within ten minutes from the time they leave the main entrance to the General Electric Works. As the headway on all city lines around the noon hour is not closer than fifteen minutes and as the regular cars are made to wait at the intersections and junction points, all express cars can receive a clearance at this hour. Very little delay is experienced in the regular service on account of these express cars having the right of way. About 75 per cent of the cars make return trips, and employees are therefore able to eat their lunch at home and return to work within one hour. It is estimated that about 25 per cent of the employees have a lunch period of one hour and fifteen minutes, and they usually return on the regular cars.

### Senate Hearings on Adamson Water Power Bill

The hearings on the so-called Adamson bill, which has already passed the House, were begun on Dec. 9 and have continued during the past week. Testimony has been presented by John A. Britton, vice-president Pacific Gas & Electric Company; W. A. Brackenridge, vice-president Southern California Edison Company; Franklin T. Griffith, president Portland (Ore.) Railway, Light & Power Company; George C. Ward, vice-president Pacific Light & Power Corporation, and others. The testimony indicated that state regulation in California had been in general satisfactory to the companies. The provision in the bill that not more than 50 per cent of the output of a plant should be sold to one customer was objected to on the ground that it will hamper development, as will also the limiting of the term to a short period, say less than fifty years. Incidentally the economy of modern steam plants was brought out, one speaker stating that his company had been able to produce from 285 to 290 kw-hr. per barrel of oil.

### New Bulletin on Coal Analyses Issued

The United States bureau of mines recently issued a small edition of Bulletin 85, "Analyses of Mine and Car Samples of Coal Collected in the Fiscal Years 1911 to 1913," by Arno C. Fieldner, Howard I. Smith, Albert H. Fay and Samuel Sanford. The present bulletin presents analyses and descriptions of samples of coal collected from many mines throughout the entire country. In order that the material in this bulletin may be made to supplement that presented in Bulletin 22, "Analysis of Coals in the United States," the same plan of geographical classification has been followed, the analyses and descriptions of the samples being grouped in alphabetical order according to the state, county and town near which the mines or prospects sampled are situated. Bulletin 22 was said to be the most comprehensive publication ever issued on the coals of the United States, and the new bulletin is an extension of that work.