

The Locomotive Weighs 265 Tons with 229 Tons on Drivers

Gearless Electric Locomotive for C. M. & St. P.

Five Units of This Type Will Be Used in Passenger Service
Over the Cascade Electrified Section

FIVE ELECTRIC LOCOMOTIVES will soon be completed and placed in operation for passenger service on the Othello-Seattle-Tacoma electric zone of the Chicago, Milwaukee & St. Paul. They are of the 3,000-volt, direct current, gearless type. A test of one of the locomotives was described in the October 10 issue of the *Railway Age*.

The original electrification from Harlowton to Avery, 440 miles, has now been operating for a number of years under the bad weather conditions common to the Rocky and Bitter Root mountains. It is significant, therefore, of the success of the original installation, that the same system will now be used to meet the severe grades and snow conditions of the Cascade range.

The motive power now in service on the eastern electrified section consists of 42 locomotives for freight and passenger service and four switchers. Of this original equipment, the freight and passenger locomotives were practically the same and differed from each other only in the gear ratio between motors and driving axles.

The new locomotives are of an entirely different design, built distinctively for passenger service and possess some very interesting mechanical and electrical features. They will be used on the new Cascade electrification strictly for passenger service, and the present passenger engines will be adapted for freight service by changing the gear ratio. The locomotives are of the bi-polar gearless type, with motor armatures mounted directly on the driving axles. In this fundamental feature they follow the design of the gearless locomotives in use on the New York Central. The principal advantage of this method of construction is the simplicity of mechanical design, which eliminates gears, armature and suspension bearings, jack-shafts, side-rods, or other transmitting devices.

The new locomotives weigh 265 tons with 229 tons on drivers. They have 14 axles, 12 of which are driving and two guiding axles. The weight of the armature and wheels is the only dead weight on the track, and this is approximate-

ly 9,500 lb. per axle. The total weight on drivers, 458,000 lb., is 86 per cent of the weight of the locomotive, which being distributed among 12 axles, results in a weight of only 38,166 lb. per axle.

One of the most interesting and important features of the locomotives is the design of the leading and trailing trucks and the method of suspension of the cab weight upon them. The successive trucks are coupled together in such a way as to dead lead or break up any lateral oscillation which may be caused by inequalities of the track. The weight of the main cab is so supported on the front and rear trucks that any lateral thrust or kick of the leading or trailing wheel against the track is cushioned by the movement of the main cab, which increases the weight bearing down on the wheel at the point where the thrust occurs, and automatically reacts to prevent any distortion of the track. The result of this design is such as to give particularly good riding qualities at high speed. Exhaustive tests have demonstrated the remarkable riding qualities of the new locomotives at speeds as high as 65 miles an hour, which was the maximum speed permissible on the length of test track available. These tests also indicated that the locomotives will operate at higher speeds with equal success.

The locomotive is designed for handling in normal service a 12-car train, weighing 960 tons trailing, against a grade of two per cent at 25 miles an hour. This performance requires 56,500 lb. tractive effort, which is equivalent to a co-efficient of adhesion of 12.3 per cent of the weight upon driving axles. The wide margin thus provided between the operating tractive co-efficient and the slipping point of the wheels, as well as the ample capacity of the motors, will allow this locomotive to haul trains with as many as 14 cars in emergency. For continuous operation the locomotive is designed to operate at 42,000 lb. tractive effort at a speed of 27 miles an hour.

The total weight supported on driving axles is practically the same as that on the present geared passenger locomotives,

weighing a total of 300 tons. The table gives the principal dimensions, weights and capacity of the gearless locomotives.

Weight electrical equipment.....	235,000 lb.
Weight mechanical equipment.....	295,000 lb.
Weight complete locomotive.....	530,000 lb.
Weight on drivers.....	458,000 lb.
Weight on guiding axle.....	36,000 lb.
Weight on each driving axle.....	38,166 lb.
Number of motors.....	12
One hour rating.....	3,240 hp.
Continuous rating.....	2,760 hp.
Tractive effort—1 hour rating.....	46,000 lb.
Tractive effort—continuous rating.....	42,000 lb.
Tractive effort—2 per cent ruling grade with 960-ton train.....	56,500 lb.
Coefficient of adhesion ruling grade.....	12.3 per cent
Starting tractive effort—25 per cent coefficient of adhesion.....	115,000 lb.
Rate of acceleration starting 2 per cent ruling grade.....	0.48 m.p.h.p.s.
Length inside knuckles.....	76 ft. 0 in.
Length over cab.....	68 ft. 0 in.
Total wheel base.....	67 ft. 0 in.
Rigid wheel base.....	13 ft. 11 in.
Diameter driving wheels.....	44 in.
Diameter guiding wheels.....	36 in.

Motors

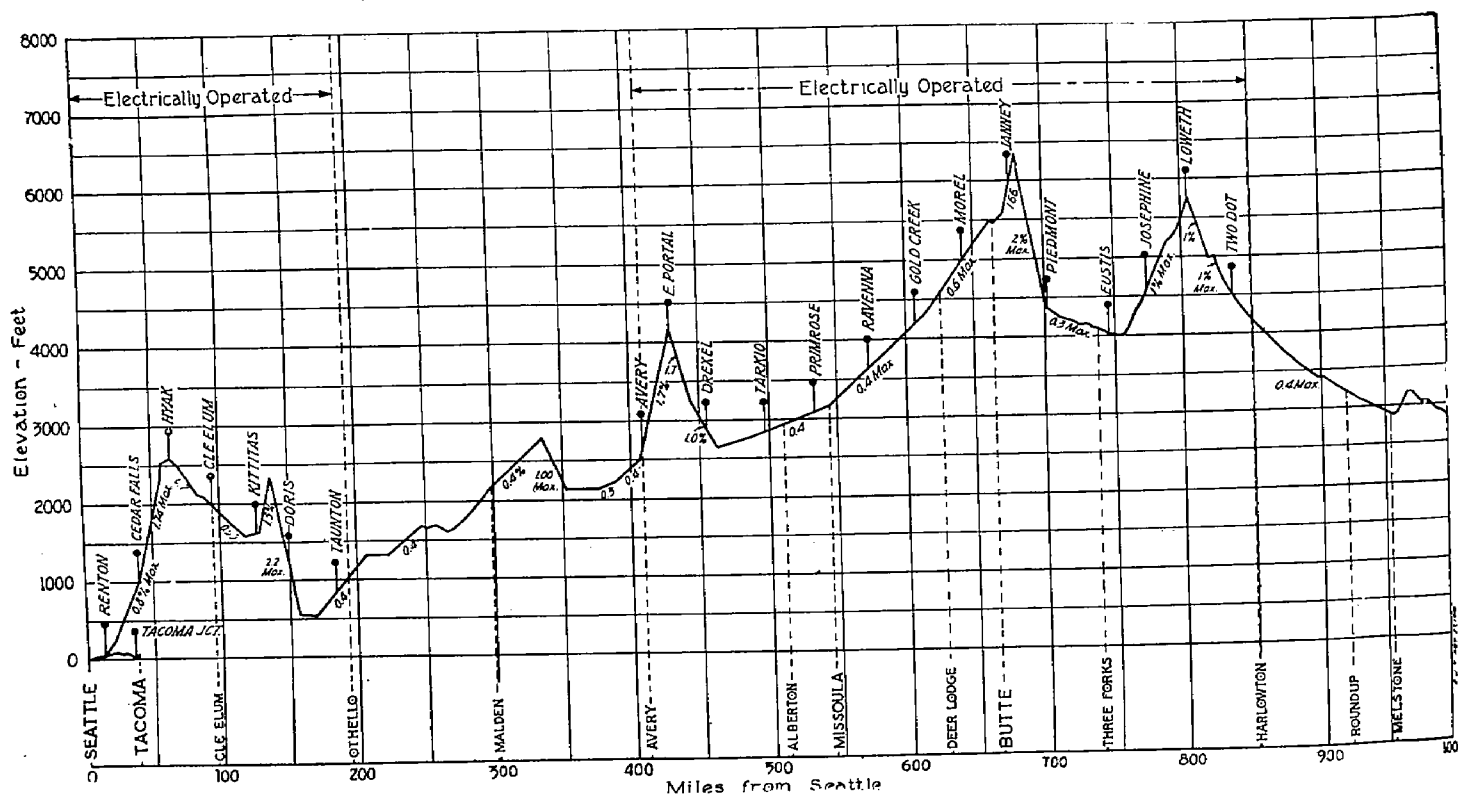
The motors are bi-polar, the two fields of each being supported upon the truck springs with full freedom for vertical play of the armature between the pole faces. The armatures are mounted directly on the driving axles. For

The six blower motors may be operated six in series, or in two groups of three in series, thus allowing for two rates of cooling for the main driving motors.

The center cab is occupied by an oil-fired steam boiler for heating passenger trains and with accessories, including tanks for oil and water, circulating pumps, and a motor-driven blower for furnishing forced draft. This center portion of the cab may be lifted out in case the steam boiler is in need of heavy repairs.

In the curved end of one of the cabs is located a small motor-generator set operating in conjunction with an 80-volt storage battery in the other cab, which supply power for operating switches, contactors, lights and accessory apparatus. The battery is, in general, similar to those used on the passenger coaches. In the cab with the storage battery are also the 3,000-volt contactors and grid resistors and an air compressor driven by a 3,000-volt direct current motor. The high speed circuit breaker is placed in the cab which contains the motor-generator set.

Power for train lighting is obtained from the motor-generator set. A switchboard located in the operator's section of one of the cabs is equipped with switches, resistors and



Profile Showing the Two Electrified Divisions of the Chicago, Milwaukee & St. Paul

full speed operation, the 12 motors are connected three in series with 1,000 volts per commutator. Control connections are also provided for operating four, six or twelve motors in series. Additional speed variation is obtained by tapping the motor fields in all combinations.

Regenerative electric braking on down grades is obtained by using four of the motors as generators to supply exciting current for the other eight, which then return power to the trolley. This reduces the size of the motor-generator set required for control, accessories and train lighting, and thereby effects an appreciable reduction in the weight of control equipment.

Secondary Apparatus

Cooling air for each pair of motors is supplied by a small motor-driven blower. This arrangement avoids the heavy duct losses encountered with a single large blower.

meters for controlling the train lighting circuit. The head end system of lighting is in use on the trains over this division. In the other operating cab is a small motor-driven air compressor, operated from the battery circuit, with sufficient capacity for raising the pantograph when first putting the locomotive in operation.

A slider pantograph, similar in construction to those now in use, is mounted on each of the operating cabs. This pantograph has two sliding contacts, giving a total of four on the slider with a double trolley. The pantograph and flexible twin trolley construction enable the locomotive to collect current as high as 2,000 amperes at speeds up to 60 miles an hour without noticeable arcing at the contact points. The second pantograph is held in reserve as a spare. Sand boxes, with pipes leading to each pair of driving wheels, are located directly beneath the pantographs outside of the operating cab.

Control

The main driving motors are controlled by a reverser handle and two control handles. Within reach of the driver are also the straight air and automatic air brake valves, the sander, the bell ringer, several meters to show what the locomotive is doing, and a number of switches for the headlight, the cab lights, the cab heater, etc. The control handles are mechanically interlocked to prevent incorrect manipulation.

The meters indicate line voltage, speed, line current and field current. The needle of the ammeter which registers line current will swing in either direction and show how much current the motors are using or how much they are regenerating to the trolley. The ammeter which registers field current registers from zero to 400. The meter scale is black from zero to 200 and red from 200 to 400, to indicate to the operator that he must not run continuously with values of field current in excess of 200 amperes.

The diagram shows a profile of the road from Seattle to a point about 1,000 miles east, including the Cascade electrification, the Harlowton-Avery electrification and the intervening 220 miles. The new locomotives will operate over the section between Othello, Seattle and Tacoma, including 17 miles of 2.2 per cent grade from the Columbia river west, and 19 miles of 1.7 per cent grade between Cedar Falls and the summit of the Cascades. The traffic over this division consists of the heavy main line transcontinental passenger trains, "Olympian" and "Columbian," carrying from eight to twelve steel passenger coaches, which will be handled over the maximum grade without helpers. Freight pushers are already in operation on the 2.2 per cent grade, using two of the locomotives from the original electrification. It is expected that electrical operation during the coming winter will assist in overcoming many of the delays which are commonly met with during winter operation in this district.

These locomotives were built by the General Electric Company in the shops at Erie, Pa.

A. F. of L. Opposes Compulsory Arbitration and Return of Railroads

THE AMERICAN FEDERATION OF LABOR has made public a series of replies by its vice-president, Matthew Woll, to questions put by Will H. Hays, chairman of the Republican National Committee, outlining the attitude of labor toward the present conditions of industrial unrest and various forms of proposed legislation. In reply to a question as to whether the Erdman act should be modified or strengthened or whether a new system for the settlement of industrial controversies should be adopted, Mr. Woll replied that evidently Mr. Hays had overlooked the fact that the Erdman act was repealed in 1913 and that the Newlands act has been substituted in its place. There is nothing particularly wrong with this enactment, he said, but the question might have been better framed had it asked what kind of railroad legislation should not be enacted. In this connection, Mr. Woll says:

"Without venturing into the problem of whether the railroads should be owned and controlled by private interests or by the government, I have no hesitancy in stating that whatever form of ownership or control may ultimately prevail that any and all legislation intended to enforce or promote compulsory arbitration or include anti-strike provisions should be defeated if we are going to be true to the ideals of freedom and democracy so clearly manifested during the war. "While strained relations between employers and employees are to be deplored, while strikes are not desirable and are favored only as a final means of protest, the wage-earners cannot and will not admit of the right of any person or any legislative body to compel them to remain at work when for

any reason whatsoever the conditions of employment become distasteful and unsatisfactory. The right to quit work after all other methods of adjustment have been exhausted is the concrete expression of individual liberty.

"The workers of America are not opposed to voluntary methods of arbitration; they are opposed to compulsory arbitration, which in fact means the fixing of wages, hours, and conditions of work by law. Such a condition and relation of employment is a denial of the rights of free men—the right to freedom of action—the right to freedom of contract. In fact, it is a return to involuntary servitude—industrial serfdom. There is nothing which is fraught with more danger, which results in more rank injustice and injury than compulsory arbitration and compulsory service.

"The Cummins bill now before Congress is the most un-American piece of legislation ever proposed by any one. It not only intends to return the railroads to private interests, but it likewise undertakes to guarantee to the railroad holders an income of 6 per cent on all their investments, whether these investments originally represented legitimate capital or merely water of every shade or color, while during the war the government only paid to the millions of patriotic investors in Liberty and Victory Loan bonds an income ranging from 3 to 4½ per cent interest.

"Besides attempting to place this heavy financial burden on the people, Senator Cummins and those associated with him further propose to turn the railroads back to these private interests with over two million of workers tied hands and feet to the railroads and the railroad interests. It is difficult to conceive a more vicious proposal than that which is now proposed to re-enact and re-establish serfdom and slavery.

"During the war, when the government found it necessary to take the railroads out of the control of private interests, these workmen were free, and as such responded in all their activities in a truly American fashion. Now that the war has ended, it is proposed to return the railroads to these self-same interests from which the government took the control, and in so doing deprive the loyal and patriotic American wage earners of their liberties and freedom. Under the cloak of industrial peace, Senator Cummins would impose involuntary servitude on the railroad workers and give added powers to private railroad interests over the lives of nearly two millions of wage earners.

"It is suggested that the government do not return the railroads to private interests for at least two years from the conclusion of peace, in order that the American people may have an opportunity to consider the many possible solutions of the railroad problem which have been put forward and so that a mature judgment may be reached and justice be done to all concerned."

Regarding profit-sharing, Mr. Woll says:

"Profit-sharing, as thus far proposed and practiced, is nothing more nor less than a sham and a fraud. In a competitive field of industry this method of compensation is not only impracticable, but will ultimately cause more friction and turmoil than any other method of compensation I know of. This method of rewarding labor for services given will not tend to equalize compensation for equal work performed; rather it will throw the question of compensation into a greatly confused state. In a monopolistic or semi-monopolistic enterprise profit-sharing can only serve as a cloak for excess profits under the guise of philanthropy.

"Profit-sharing and like methods of compensation now urged are designed principally to prevent organization of employees into trades unions and to tie the workers to their job as well as to compel them to labor under the most intensive strain of which they are capable, by an appeal to undue selfishness. Its very conception is an impressive indictment of the present questionable method of industry as a whole."

The Plumb plan is not mentioned in the letter.

A. R. A. Committees Present Progress Reports

Work Accomplished in Each Section Since Its Organization and Status of Present Studies Outlined at Chicago Meeting

PROGRESS REPORTS were made by each of the seven sections of the American Railroad Association at a meeting held in Chicago on November 18 and 19. In addition the Executive Committee of the association held meetings on November 17 and 18 and subsequently presented a report to the association outlining briefly the important features which have occupied the attention of the association since its last meeting on November 15, 1916, and the association's historical development. The report deals with the development in car service and car service rules, the co-operation obtained with military authorities during the war, the co-ordination of the various voluntary railroad organizations and the consequent reorganization of the association.

The report of the Executive Committee in addition contained the following facts and recommendations:

The president of the association has been authorized to appoint a committee of four to investigate and recommend a plan covering the preparation and publication of the records of the American railroad men in the war, both at home and abroad. T. C. Powell, director of the Division of Capital Expenditures, United States Railroad Administration; Howard Elliott, president of the New York, New Haven & Hartford; W. W. Atterbury, vice-president of the Pennsylvania Railroad; and Howard G. Kelley, president of the Grand Trunk, have been appointed members of this committee. A report will be promulgated as soon as the committee completes its labors in this connection.

In order to secure uniformity and in the interests of economy the general secretary has been authorized to act as agent in the publication of such tariffs as may be nationwide in application. Up to the present time a storage tariff, a tariff covering penalties for detention of equipment and a demurrage tariff have been filed by the general secretary and arrangements have been made for the filing of rules covering the handling of perishable freight and regulations governing equipment under private ownership. The suggestion has been made, and has been concurred in by the director general, that seven representatives of the corporations be appointed as advisory members of the Executive Committee. The director general communicated with T. DeWitt Cuyler, chairman of the association of Railway Executives, suggesting the appointment of seven corporate officers to become advisory members of the Executive Committee. Mr. Cuyler thereupon nominated and the Executive Committee elected the following as advisory members:

J. H. Hustis, president, Boston & Maine, representing the New England district; W. W. Atterbury, vice-president, Pennsylvania Railroad, representing the Trunk Line district; A. H. Smith, president, New York Central, representing the Central Traffic district; W. H. Finley, president, Chicago & Northwestern, representing the Western district; E. N. Brown, president, St. Louis-San Francisco, representing the Southwestern district; J. Kruttschnitt, president, Southern Pacific, representing the Transcontinental district; C. H. Markham, president, Illinois Central, representing the southern district.

The Executive Committee has authorized Section IV—Traffic to employ a chairman to devote all of his time to the interests of that section. The Executive Committee has also approved the election of C. W. Crawford to succeed George Hodges as chairman of the general committee of Section V—Transportation.

Attention has been directed to the question of securing greater efficiency and economy in the maintenance of way and structures department and the Executive Committee has therefore referred this subject to the general committee of Section II—Engineering, with instructions to have a study

made of measures for obtaining higher efficiency and economy in the maintenance of way and structures department and present a plan which will effect the greatest economy and efficiency in the maintenance of way and structures department, both as to the handling of labor and material; also to present suggestions as to the units by which maintenance of way and structures work may be gaged, the recommendations to include suggestions as to improvements in supervisory methods and especially in the direction of educating supervisory forces to the importance of the subject.

The Executive Committee has appropriated the sum of \$8,000 per year for two years for the expenditures of the Committee on Stresses in Railroad Track. In addition the committee has approved the appropriation of \$7,500 for the continuation of the work of the rail committee beginning June 1, 1919.

Report of Section I—Operating

The Committee on Operating Rules has considered and made a recommendation upon a rule covering the use of dimmers on electric headlights.

The Committee has had referred to it a number of suggested changes in the Standard Code. The suggestions will be considered by the committee when a revision of the code is necessary.

Among the matters now being developed by the committee are the standardization of safety fuses and the standardization of bunting signaling flags.

A Sub-Committee has been appointed for the purpose of recodifying the existing questions and answers to the present Codes of Train Rules, Block Signals and Interlocking Rules.

The Committee on Grade Crossing Protection and Trespassing has given much study to the subjects which it has in hand and is unanimously of the opinion that it is essential and important to obtain National legislation pertaining to trespassing and the control of highway traffic at grade crossings. It has prepared separate statutes covering grade crossing protection and trespassing on railroads. These statutes have been submitted to the several committees of railroad counsel for an expression of their views. A conference with the National Association of Railway Commissioners and the American Automobile Association will be held also in order that their advice and co-operation may be obtained.

The committee has recommended to the General Committee the adoption of the Nine Second Whistling Code which provides that in whistling for grade crossings, the two long blasts shall be of two seconds' duration and the two short blasts of one second duration each, with a one second interval between each blast.

The Committee on the Safe Transportation of Explosives and Other Dangerous Articles, which is also the Executive Committee of the Bureau of Explosives, has been active in the safe transportation of explosives and other dangerous articles during the continuance of the war.

The Committee is also making progress in the work of enforcing the requirements of Section III—Mechanical (M. C. B.) in the matter of tank car tests, safety valve tests, etc., which work, by direction of the Executive Committee, was turned over to the Bureau of Explosives in November, 1916.

Report of Section II—Engineering

The report of Section II—Engineering consisted in the presentation of new specifications for track scales, pre-

pared in co-operation with committees of other interested associations and a review of the action taken at the annual meeting of the American Railway Engineering Association. The scale specifications will be published in a later issue.

Report of Section III—Mechanical

The report of the general committee of Section III—Mechanical reviews its own activities and those of the section as a whole from the time of the first meeting of the temporary general committee on February 17, 1919, up to and including the last meeting of the general committee held on September 23 and 24, 1919. With the exception of the action taken at the meeting held on September 23 and 24, reports of these activities have all appeared in various issues of the *Railway Age*.

At the meeting held on September 23 and 24 the following resolution admitting the Master Car and Locomotive Painters' Association as a division of Section III—Mechanical was passed.

Resolved, that the secretary be instructed to notify the general secretary that the general committee of Section III—Mechanical accept the proposal of the Master Car and Locomotive Painters' Association to unite with the Mechanical Section of the American Railroad Association as the "Equipment Painting Division."

Letter Ballots

The recommendations contained in the reports from the following committees were considered at the annual meeting, were referred to letter ballot in accordance with the Rules of Order of this Section, and every recommendation adopted by more than the two-thirds majority required: Standard and Recommended Practice (A. R. M. M.); Standard and Recommended Practice (M. C. B.); Standard Blocking for Cradles of Car Dumping Machines; Loading Rules; Specifications and Tests for Materials (A. R. M. M.); Specifications and Tests for Materials (M. C. B.); Car Wheels; Car Trucks; Couplers; Welding Truck Side Frames, Bolsters and Arch Bars; Car Construction; Train Lighting and Equipment, and Train Brake and Signal Equipment.

The vote on the letter ballots was approved by the General Committee at a meeting held September 23 and 24, 1919, with the following exceptions:

The vote on the recommendation from the Committee on Car Trucks was approved with the exception that the General Committee ruled that the non-standard axle of the Norfolk & Western with $5\frac{1}{4}$ by 9 in. journals should be permitted on a limit load of 148,000 lb., and shown in the table of non-A. R. A. standard axles, also that in case of repairs on foreign lines, it would be permissible to replace this axle with the 5 by 9 in A. R. A. standard axle, in which case the cars should be re-stenciled to a limit load marking of 132,000 lb.

The recommendation from the Committee on Car Wheels providing that the letter "C" from the legend "M. C. B." should be chipped off when the wheels fail to meet the specifications, was considered, and the committee decided that the letter "C" should only be chipped off when the wheels fail to pass the thermal or drop test, or have some physical defect which impairs their serviceability.

Rules of Interchange

The report of the Committees on Arbitration and The Revision of Passenger Car Rules of Interchange were adopted on the floor of the convention, and the changes recommended in the Rules of Interchange approved by the Executive Committee at a meeting held July 31, 1919. These changes were then approved by the United States Railroad Administration, and the Rules of Interchange revised and issued to become effective November 1, 1919.

In addition to the above, at a meeting of the General

Committee held September 23 and 24, 1919, it was recommended that the labor rates shown in these rules be revised to conform to the rates at present in effect on the railroads under Federal control. This recommendation was approved by the Railroad Administration, and incorporated in the book as revised, effective November 1, 1919.

Loading Rules

At the annual meeting, the recommendations contained in the report of the Committee on Loading Rules were accepted and referred to letter ballot, with the exception of the recommendation for changes in the rule governing the loading of structural material, plates, girders, etc., on open cars (twin or triple loads), which was approved by the Convention and Supplement No. 1 to these Rules issued, effective August 1, 1919. The recommendations submitted to letter ballot were all adopted by more than the two-thirds majority required by the Rules of Order. The recommendations contained in the letter ballot from the Committee on Loading Rules, if approved, will be covered in an additional supplement, to be known as Supplement No. 2.

Tank Car Specifications

At the annual meeting held June 18-25, inclusive, the report of the Committee on Tank Cars was received, subject to action of the General Committee. At a meeting of the General Committee held September 23 and 24, the recommendations from the Committee on Tank Cars for changes in the Tank Car specifications (Standard), were approved, to be incorporated in a reissue of these specifications. In addition, several other proposed changes in the Standard Specifications were received from the Tank Car Committee and approved.

Manual of Standard and Recommended Practice

At a meeting of the General Committee held September 23 and 24, it was decided to issue the Manual of Standard and Recommended Practice of this Section in a separate loose-leaf volume instead of being included in the back of the Proceedings of the Annual Meeting. This will eliminate the reprinting of a great portion of these Standards each year, and will provide a better reference book for the mechanical departments of railroads and manufacturing companies. The Committees on Standard and Recommended Practice and Specifications and Tests for Materials have been designated to supervise the preparation of this manual.

Standard Form of Interchange Agreement

At a meeting of the General Committee held at Atlantic City, September 23 and 24, a standard form of interchange agreement was approved, to be executed by all subscribers to the Rules of Interchange to replace the present method of subscribing to these rules shown in the Rules of Interchange—Rules 128 to 130, inclusive. This form of agreement is shown below.

Agreement Adopting Interchange Rules

The Subscriber hereto adopts and agrees, jointly and severally, with each and all other parties (whether corporations, partnerships or individuals) owning or possessing railroad cars used for the transportation of commodities, which parties have respectively entered into agreements in effect similar to this instrument, that the Subscriber will abide by the Code of Rules governing the condition of, and repairs to, freight cars for the interchange of traffic, as formulated and promulgated by the former Master Car Builders' Association and by the American Railroad Association (Section III—Mechanical) or by either thereof (which rules are designated on the minutes of said Association's proceedings and are commonly known as "Interchange Rules"), and by each of said rules, and as well will abide by each and all decisions and interpretations of the Arbitration Committee provided for by said Code of Rules, until this agreement on the part of the Subscriber shall be terminated by three months' notice in writing filed with the General Secretary (or such other officers as from time to time shall be acting as Secretary) of said Railroad Association, or of such body as shall at the time have succeeded thereto.

Committees of Section III—Mechanical

At the meeting of the General Committee held September 23 and 24, 1919, the standing and special committees for Section III—Mechanical for the coming year were appointed.

Subjects Assigned to Committees

The following subjects have either been assigned to committees or are to be the subjects of individual papers:

1. Investigation of the proper number of cross-ties to be used on hopper coal cars. Referred to Committee on Car Construction.
2. The proper fibre stress to be employed in the design of helical springs for different diameters of steel wire from 1/2-in. to 1 1/2-in. diameter. The ordinary spring table calls for 80,000 lb. throughout for all sizes, but it is well known that this is not the manufacturers' practice, and in fact in many cases it is impossible to obtain a proper spring with the smaller sizes of wire. Referred to Committee on Specifications and Tests for materials.
3. Consideration of adopting the standard half tape sizes for cast iron and rough rolled steel wheels. Referred to Committee on Car Wheels.
4. That in the manufacture of steel wheels the wheels be machined to exact diameters. Referred to Committee on Car Wheels.
5. Repairs to superheater units. Referred to Committee on Superheater Locomotives.
6. Desirability of more water and steam space above the crown sheet. Referred to Committee on Design and Maintenance of Locomotive Boilers.
7. Equated tonnage ratings. Referred to Committee on Train Resistance and Tonnage Rating.
8. Design for coal space of locomotive tenders to allow the coal to flow within easy reach of the fireman, and to permit it to practically all feed into the hoppers of locomotive stokers. Referred to Committee on Mechanical Stokers.
9. Specifications for tank hose. Referred to Committee on Specifications and Tests for Materials.
10. Water glass fittings and mountings. Referred to Committee on Design and Maintenance of Locomotive Boilers.
11. Standard practice for beading tools for boiler tubes or fuse. Referred to Committee on Design and Maintenance of Locomotive Boilers.
12. Proper location of blow-off cocks in locomotive boilers. Referred to Committee on Design and Maintenance of Locomotive Boilers.
13. The comparative merits of hydrostatic and force feed lubrication for locomotive cylinders and steam chests and best method of application. Referred to Committee on Superheater Locomotives.
14. Front end netting and netting door and other draft appliances. Referred to Committee on Fuel Economy and Smoke Prevention.
15. The study of ash pit and coal chute operation including organization and supervision. Roundhouse operations as a whole. Referred to Committee on Engine Terminals, Design and Operation.
16. Modernization of existing old locomotives. Referred to Mr. G. M. Basford, President, Locomotive Feed Water Heater Co., New York, N. Y., with request that he prepare an individual paper on it.
17. Automatic hose connectors for freight and passenger equipment. Referred to Committee on Train Brake and Signal Equipment.
18. A study of locomotive operation from the point of view of a large investment. Referred to Mr. G. M. Basford, President, Locomotive Feed Water Heater Co., New York, N. Y., with request that he prepare an individual paper on it.
19. Electric arc welding in railroad repair shops. Referred to Committee on Autogenous and Electric Welding.
20. Combustion chambers for locomotive boilers; results as to fuel economy; difficulties in maintenance and other points of interest. Referred to Committee on Design and Maintenance of Locomotive Boilers.
21. Modernizing freight equipment. Referred to Committee on Car Construction.
22. Economical diameters of piston valves of superheater locomotives, with recommendation for Standard Practice in connection with various cylinder diameters. Referred to Committee on Superheater Locomotives.
23. What shape of exhaust nozzle will cause the highest vacuum and least back pressure in cylinders. Referred to Committee on Fuel Economy and Smoke Prevention.
24. Automatic coal weighing devices for locomotive tenders. Referred to Mr. J. S. Spurway, Secretary, New South Wales Government Railways and Tramways, Sydney, Australia, with request that he prepare an individual paper on this subject.
25. Snow fighting apparatus. Referred to Mr. C. E. Fuller, S. M. P. & M., Union Pacific R. R., Omaha, Neb., with request that he prepare an individual paper on this subject.
26. Designs, with complete lay-outs, for round houses of various sizes. Referred to Committee on Engine Terminals, Design and Operation.
27. Power Plants for both round house terminals and repair shops and suitable stokers for such power plants. Referred to Committee on Modernization of Stationary Boiler Plants.
28. Ash pit lay-outs for both dry and water pits. Referred to Committee on Engine Terminals, Design and Operation.
29. Adequate lighting of engine terminals for night work. Referred to Committee on Engine Terminals, Design and Operation.
30. Specifications for Mechanical Rubber Goods. Referred to Committee on Specifications and Tests for Materials.

Recommendations

The General Committee asked for approval of its action in handling the affairs of the Section and of the recommendations covered by letter ballots of the Section.

Report of Section IV—Traffic

At a meeting of the Committee on Standard Containers, Packing and Marking, held August 6, 1919, the question of the constantly increasing amounts paid out for lost and damaged freight received earnest consideration, and decision reached that some energetic and corrective measures be taken, whereupon a joint conference was held on August 27, 1919, with corresponding committees of the other sections, at which it was arranged to launch a campaign to better conditions, selecting for this purpose a few commodities or situations particularly susceptible, and in co-operation with the Operating, Transportation, Freight Claim and Accounting Departments, and the public, bring about remedies.

At a meeting of the Committee on Weighing and Inspection of Freight Traffic, held September 11 and 12, 1919,

there was received from four different sources suggestions that something should be done to secure more accurate weights on less than carload freight, preferably by inducing shippers to declare on their shipping bills the correct weight so as to save the time taken in weighing over house scales and the consequent delay in loading, and to shippers' teams waiting to deliver their goods, especially in the rush hours. This would result in operating economies and the elimination of a great many freight claims for overcharge in weights. A conference will be held with corresponding committees of the Operating and Freight Claims Sections.

Report of Section V—Transportation

The General Committee has continued negotiations with the National Industrial Traffic League with respect to the National Car Demurrage Rules and recommended several changes in the rules and demurrage rates which have been made effective on all railroads throughout the United States. As a result of these changes there was difficulty in the application of certain rules and to secure uniformity the following curriculars have been issued covering interpretations and recommendations formulated after consultation with the Interstate Commerce Commission and the League:

1931.....	issued November 14, 1918
1932.....	issued November 19, 1918
1954.....	issued July 1, 1919
S. V. 11.....	issued July 16, 1919
1959.....	issued September 17, 1919

As a result of joint conferences with the Committee on Demurrage and Storage of the League and representatives of the Interstate Commerce Commission, there has been completed a recodification of the National Car Demurrage Rules, the purpose of which is to bring the existing Instructions, Explanations and Interpretations into the rules themselves; to clarify the rules in accordance with lawful practice; to obviate the necessity for future interpretations, so far as may be practicable, and to secure uniformity in their application. The revised rules have received the tentative approval of the Interstate Commerce Commission. They have been submitted to the Railroad Administration, with the recommendation that they be made effective December 1, 1919, through the publication of a joint tariff for the account of all railroads in the United States, including the non-Federal controlled lines. This joint tariff will be issued by J. E. Fairbanks, general secretary.

Attention has been called to the difficulty of members in securing settlement for cars destroyed in Mexico as well as for per diem, repair bills, etc. To expedite the handling of this matter, conferences were held with the representatives of the National Railways of Mexico and the General Committee has submitted for ratification by the corporate officers of railroads, members of the Association, a form of agreement under which the National Railways of Mexico will make satisfactory adjustment.

The Committee on Car Service, acting jointly with the Committee on Records, has prepared a code of rules to govern the handling of cars under authoritative administration and has also prepared a revision of the Code of Per Diem Rules to eliminate so far as possible the large amount of work incident to adjustment of per diem discrepancy claims, etc. Owing to the importance of these subjects, the General Committee has submitted its recommendations to the Executive Committee. In accordance with the Rules of Order, it has also made recommendations to the Executive Committee on the following subjects:

- Restoration of per diem settlements between roads under Federal control.
- Demands for increase in mileage allowance on private refrigerator cars.
- Application, enforcement and proper supervision of demurrage, storage and track storage tariffs.