the boiler is partitioned off, as in the modern Clench type. However, nothing is known of its value in service. Hittorf, in 1869, introduced a new type, in which the superheater was in a drum on top of the boiler, as with one of the Moncheuil types mentioned before.

COMPOUNDING SUPERSEDING SUPERHEATING.

In 1865, compounding first came into prominence, and from that time on superheating was rapidly abandoned, for equally good results could be obtained with compounding, without the evil effects that at first attended the use of superheated steam. It was found that with steam at 400 degrees F. or over, which was the common practice, the animal fats, at that time the only ones procurable, it being before the day of the mineral product, became dessicated by the heat, leaving a hard product that not only scored the wearing surfaces, but also increased the friction. The attendant high pressures used in multiple expansion engines, was also a detriment to superheating from the same cause, owing to its high initial temperature, which, while normally high, is much greater by the superheating.

Nothing appears to have been done in America along the lines of superheating until in 1870 (when its use was being given up on the European Continent by all but Hirn and his followers), the Chicago, Burlington and Quincy Rd. applied a type of its own, like the modern Clench, to one of its locomotives. The trials showed some economy, but not sufficient to warrant its introduction into actual service, as the maintenance expenses were materially increased. For that reason it was abandoned.

REASONS FOR RECENT NEW LIFE.

With the introduction of hydrocarbon, mineral lubricating oils, balanced valves and improved packing, the use of considerably higher temperature became possible, and in 1890, interest in the subject was again renewed by the results obtained in Germany by Gehre, Schwoerer, Uhler and others. Since that date, the progress in England and Germany in stationary practice has been very marked.

The first man of recent times to use highly superheated steam was Dr. Wm. Schmidt, who in 1892 used a small single-acting, stationary engine with steam at a temperature of 650 degrees F. The engine was purposely made single-acting, for it was at first thought that, as with gas engines, the temperatures would be detrimental to the materials of the engine; but Schmidt modified the details so as to use superheated steam double-acting without these deteriorating results.

This development by Dr. Schmidt was carried forward to such an extent that at present there are very few new plants of any pretensions that are not using superheated steam. The present development in the application of superheaters to locomotives is due to Tarbe and Muller, of the Prussian State Railways, who, in 1898, arranged to have two locomotives equipped with superheaters according to Dr. Schmidt's design. From that time on the spread has been very rapid, with the exception of the present compounding tendency in Germany, previously mentioned.

In America the revival of superheater locomotives was due to Roger Atkinson, Mechanical Superintendent of the Canadian Pacific Ry., who, in 1901, applied a Schmidt smoke-box superheater to a simple 10-wheel freight locomotive. So satisfactory did this prove that further locomotives were equipped, not only with Schmidt, but also with the Cole type. Numerous other roads, both in Canada and the United States, have tried superheater locomotives with varying degrees of success. It still remains, however, for the Canadian Pacific Ry., the pioneers in the field, to retain the supremacy, H. H. Vaughan, as is well known, being probably the strongest exponent of locomotive superheating in America. The type used by this road is the Vaughan-Horsey, designed by Mr. Vaughan and A. W. Horsey, formerly Mechanical Engineer, Locomotive Department, Angus shops, and now District Master Mechanic at Farnham, Que.

Recent history with regard to superheater practice on locomotives is so familiar to all that no further comments need be made on the subject. The one conclusion that stands out the strongest is the fact that when properly designed and operated a material net economy can be, and is, effected.

Of the other roads in Canada, the Canadian Northern is the only one that has adopted the superheater policy. This road has 20 now in service and 20 more on order. Neither the Grand Trunk nor Intercolonial have as yet had any locomotive equipped with superheaters.

Selection of Length of Transition Curve.

By Frank H. Carter A.M. Am. Soc. C. E.

In fixing the alignment of a projected fast interurban electric railway, the writer was confronted with a dearth of information concerning either theory or practice for rigorously selecting proper lengths of easement or transition curves. The only line of thought or suggestion on the subject which could be found was that outlined by Prof. Talbot in his work on the transition curve, and that appeared to be more or less specially applicable to his particular spiral. As spirals of the Searles type had been adopted and were in use on the road in question, it seemed inadvisable to make any radical change in the type of easement curve. None of these standard easement curves, however, were of a length greater than 100 ft., while the theory which is presented herewith demands lengths up to and in some cases exceeding 300 ft.

While the writer was engaged in an attempt at a rigorous solution of the problem, there appeared a very creditable report of the Committee on Track of the American Railway Engineering Association (Bulletin 108) with a principle, new to the writer, from several of the roads; namely, a length of curve dependent upon the rate of rise of the outside of a train on a curve (at the rail) in inches per second.

The rate of rise of super-elevation on easement curves is largely, if not entirely, a question of its effect on passengers as to whether the rapidity of vertical rise of one side of the train produces a disagreeable sensation. An attempt to formulate the proper length of transition curve from the rate of rise of rail in inches per 100 ft., without regard to the speed of the train, is approaching the problem from the wrong standpoint. In any formula of type $I = C\ D\ V^2$ the constant C, as will be shown, fixes the rate of rise of super-elevation of rail; therefore, but one curve and one speed will satisfy this equation in regard to rapidity of rise of train in inches per second. All other curves or speeds will convey different sensations of ease of riding to the passenger. The average rate of rise of the outside of the train (at the rail) in inches per second should be the governing function for the determination of the length of transition curve, as will be discussed a little later. In fixing alignment, smoothness of riding is all important for comfort; hence, the same rate of rise of super-elevation on curves in inches per second should govern for the entire road, where a schedule can be predicted with any degree of certainty, a difficult matter, of course, in most cases for new roads, but almost always capable of realization in re-alignment, when time tables are established.

It appears to the writer that the provision that "the length of the curve should not be less than 30 times the elevation in inches for the ultimate speed" (literally meaning that no rise of super-elevation shall be greater than 1 in. in 30 ft.) is a wise one for places where the speed cannot be predicted, but that is not the best practice, in that the rate of rise of transition will not in that case depend upon the speed of the train.

The last clause of the paragraph for the Manual of Recommended Practice of the American Railway Engineering Association, concerning the length of easement curve: "that the curve should not be less than two-thirds the ultimate speed in miles per hour times the elevation in inches," places a more rapid rate of rise of the car in inches per second than has been considered best practice for steam roads, according to available information in the hands of the writer. By this rule the rate of rise would amount to about 2.17 ins. per sec., while practice appears to be from 1¼ to 1½ ins. per sec. rise.

The length of easement curves used on the Cleveland, Cincinnati, Chicago & St. Louis Ry. is apparently based on an assumed rate of rise of 1¼ ins. per sec., and the practice of the Delaware, Lackawanna & Western Ry. is given as 1½ ins. per sec.

It is true that cases may be cited where faster rates of rise have been used; notably, a local fast urban electric railway has several spirals where the rate of rise is 1 in. in 20 ft., corresponding to 2.20 ins. per sec. vertical rise at 30 m.p.h.

These curves are said to be easy riding from the standpoint of electric road practice, but jolts and roughness of riding which might be tolerated by passengers on an urban electric road or an elevated road, would not be considered good practice for steam roads.

The foregoing is taken from the appendix to the reports of the American Railway Engineering Association's committee on track, as presented at the last meeting.

MECHANICAL SUGGESTIONS.

It is a time-honored saying that "familiarity breeds contempt." Those few words sum up briefly the view held by many of our most valued readers, who have access to funds of invaluable information and data that would prove of great assistance to the railway fraternity if only disseminated through the medium of the technical railway press. What is in mind at present is the dearth of good shop information. Each shop, in addition to having the standard tools and equipment necessary to good production, has been compelled from time to time to exercise native ingenuity in devising ways and means in the form of tools, methods, etc., to cope with the problem in hand. Every shop is full of such ideas—ideas that would likely prove of value to others. Besides, we are willing to pay for them at a liberal rate. Send them in, whether or not you consider them worthy of publication, and we will make the necessary suggestions if they do not prove satisfactory.

The city of Montreal has purchased from the C.P.R., for $309,911, an area of land in Verdun, for a site for the civic filtration plant.

The Canadian Pacific Land Co., having agreed to insert in future advertisements the words "not connected with the C.P.R.," the C.P.R. has withdrawn the action entered in the Court of Chancery, London, Eng., for an injunction to restrain the company using the words "Canadian Pacific" in its title.