

Note.

The use of the "spring rail frog" gives every satisfaction in America. It is also used in New South Wales with satisfactory results. The smooth running of high-speed trains through station-yards laid with "spring rail frogs" in America was very noticeable. Safety is not sacrificed, and a much longer crossing life is obtainable. It might be desirable to give the "spring rail frog" a trial in New Zealand.

4. CONCRETE AND IMBEDDED METAL.

The use of concrete strengthened by the use of imbedded metal in railway-works: Comparison from the point of view of cost of bridges of concrete strengthened by the use of imbedded metal, with those of metal.

Reporters.—America—Mr. J. F. Wallace, Chief Engineer, Panama Canal Commission; Russia—Mr. Kareircha; other countries—Mr. W. Ast, Austria.

Conclusions of Congress.

(1.) Reinforced concrete has received many and important applications on railroads both from the technical and economical points of view; it can fully and successfully compete with masonry and timber or steel construction.

(2.) Tests of reinforced concrete structures, theoretical researches on the question, and the results of practice justify the conclusion that such structures need not cause any apprehension, and that their application can be recommended to railway administrations.

(3.) Railway practice shows that carefully built reinforced concrete structures give excellent results, and require practically no maintenance. For this reason the use of reinforced concrete should be recommended, even if the cost of construction should be higher than for another system of construction.

(4.) Reinforced concrete structures are an especially great help in countries where materials, stone or iron, are difficult to obtain in large sizes.

(5.) Reinforced concrete permits of the rapid building of structures with readily obtained materials, and this avoids the necessity, so trying in practice, to give special orders to shops.

Note.

A notable example of reinforced concrete-work is now being undertaken at Auckland, where a large contract is being carried out for the Harbour Board.

SECTION 2.

5. LOCOMOTIVES AND ROLLING-STOCK.

Locomotives of great power; increase in the power of locomotives by the adoption of high pressures and of the compound principle; improvements in construction from this point of view; use of nickel steel.

Reporters.—America—Mr. J. E. Muhlfeld, General Superintendent of Motive Power, Baltimore and Ohio Railroad; other countries—Mr. E. Sauvage, Chief Consulting Engineer of the Western Railway of France.

Conclusions of Congress.

The power of locomotives is more limited in Europe than in America, owing to the lower allowance of weight per axle. European engineers generally agree in thinking that "compounding admits of the construction of engines giving the maximum power and economy." This system utilises the steam very well and does not appear to increase to any noticeable extent the cost of maintenance of locomotives. It does make the maintenance of boilers more difficult, but that is due to their increased size and higher working-pressure, which are necessary in all cases. Almost all locomotives built in France in recent years have four balanced cylinders. These engines as well as compound engines of other systems are also employed in other European countries, especially Germany, Austria, Spain, &c. Several engineers in Great Britain and Ireland express equal satisfaction from their use, and insist on the advantage of separating the high- and low-pressure machinery. A number of American engineers also express opinions favourable to compound locomotives, which have given satisfactory results on the Atchison, Topeka, and Santa Fe Railway. The sentiment on this matter is, however, less unanimous in the United States than in Europe. The Congress has been informed of the experiments shortly to be made with four-cylinder balanced compound locomotives in New Zealand.

The introduction of American locomotives in Europe and European locomotives in America has had the advantage of making known on both sides some interesting details of construction, particularly the light weight of the parts of European locomotives and the siphon and sight-feed lubricators of American locomotives.

The constantly increasing use of cast steel is observed, which in the United States has even been tried for cylinders.

The use of the Walschaert valve gear is extending in the United States. Generally speaking, all the engineers who have spoken of piston valves appear well satisfied with them. A number of tests of automatic stokers have been made in the United States and on the Great Western Railway of England, but as yet the results have not been definite. It has also been found both in America and in England that without the aid of those devices, but with proper arrangements of grates, the heaviest firing necessary at the present time can be effected by hand without difficulty.

Finally the Congress has examined the use of articulated locomotives of great power on lines of irregular grades, particularly Mallet locomotives, and those designed by the North France and North Spanish railways.