A RECORD IN ORE UNLOADING.

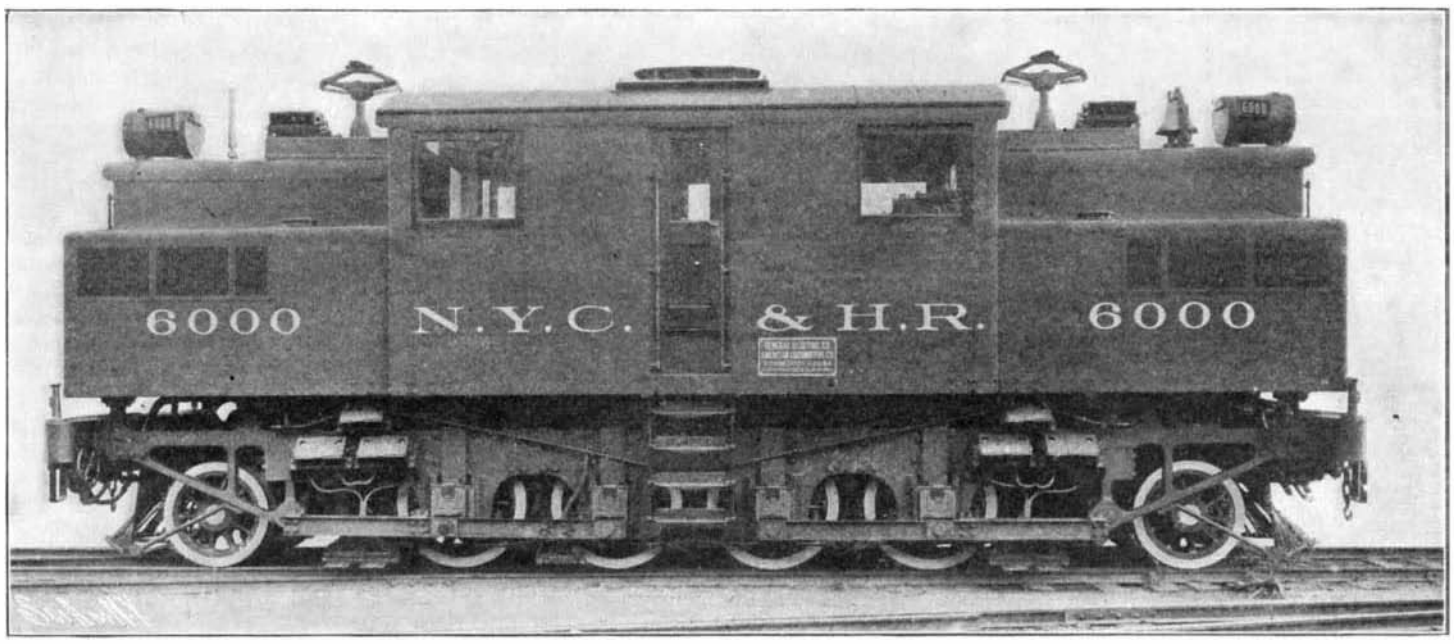
BY W. FRANK M'CLURE.

A new world's record for the rapid handling of iron ore has been established during the present season of navigation upon the Great Lakes. In the making of the new record the former one was cut straight in two, an accomplishment of no little moment in the industrial world. By the working of two kinds of modern ore machines at one time in the new steamer "A. B. Wolvin," nearly 10,000 tons were removed in four hours and a half.

Soon after the launching of the new steamer "Wolvin" last spring, an article appeared in the SCIENTIFIC AMERICAN descriptive of the distinctive features of that ship which were expected to work something of a revolution in ore handling. Chief among these was mentioned the hopper bottom, which admitted of keeping the ore at all times within reach of the automatic clam-shell buckets; also that the length of this hopper, without division, is 409 feet. This construction has come up to all expectations in facilitating the work of loading and unloading.

The new record was made at Conneaut harbor, the port which has in recent years been noted for its wonderful machinery and its notable records. The work of unloading was started at 7.22 in the morning and was completed at exactly 11.52. The total delay in the continuous operating of the machines did not exceed five minutes. Eight machines were used in all, four of the Brown machines, which are fitted with clam-shell buckets, and four of the Hulett machines, which are the automatic ore unloaders with the ten-ton buckets. The accompanying protograph shows both kinds of machines at work in the "Wolvin's" hold, those at the forward end of the vessel being the Browns. In all the vessel has thirty-three hatches. As soon as one machine finished a hatch it was transferred to another without a moment's delay. Officials of both the dock and the machine companies were on hand to witness the test and to assist in avoiding the slightest impediment. The exact amount of ore removed was 9,945 tons. The Hulett machines removed 169 carloads of the total of 226 which the boat contained.

The former record was held by South Chicago, where a similar cargo was removed from the "Wolvin" soon after it entered the ore trade. Ten and a half hours were required for the unloading operations at that time. The vessel was under the machines for fifteen hours, of which four and a half hours were lost. Fifteen machines were used.



NINETY-FIVE-TON ELECTRIC LOCOMOTIVE FOR NEW YORK CENTRAL AND HUDSON RIVER RAILROAD.

Of interest in connection with the records of the "Wolvin" is the announcement which has been made this fall that four vessels still larger than the "Wolvin" are to be built for the Pittsburg Steamship Company, which is the lake end of the United States Steel Corporation. These vessels are to be 569 feet over all, 540 feet keel, 56 feet beam, and 31 feet deep. Their construction will be of the arch system, resembling that of the "Wolvin" and "Sahara." There will be thirty-four hatches and no bulkheads in the hold. The four vessels will cost more than $1,500,000 and are to be completed by the first of next July.

ELECTRIC RAILWAY LOCOMOTIVES FOR THE NEW YORK CENTRAL.

The broad field for the electric locomotive is undoubtedly to be found in the partial or complete electrification of existing steam railroad systems, and the delay in the development of this department of electric transportation must be ascribed to the radical and extensive changes in equipment and operation, the magnitude of the necessary investment in the equipment of trunk lines, and the general lack of appreciation of the merits and economies to be obtained.

There are, however, certain classes of service in connection with steam railroads, electric railways, and industrial transportation systems in which the advantages of the electric locomotive and the economies to be obtained by its adoption are at once apparent. The appreciation of these advantages has already resulted in several successful installations of electric locomotives, both on steam railroads and in other classes of service, which are proving the adaptability and economy of the electric locomotive.

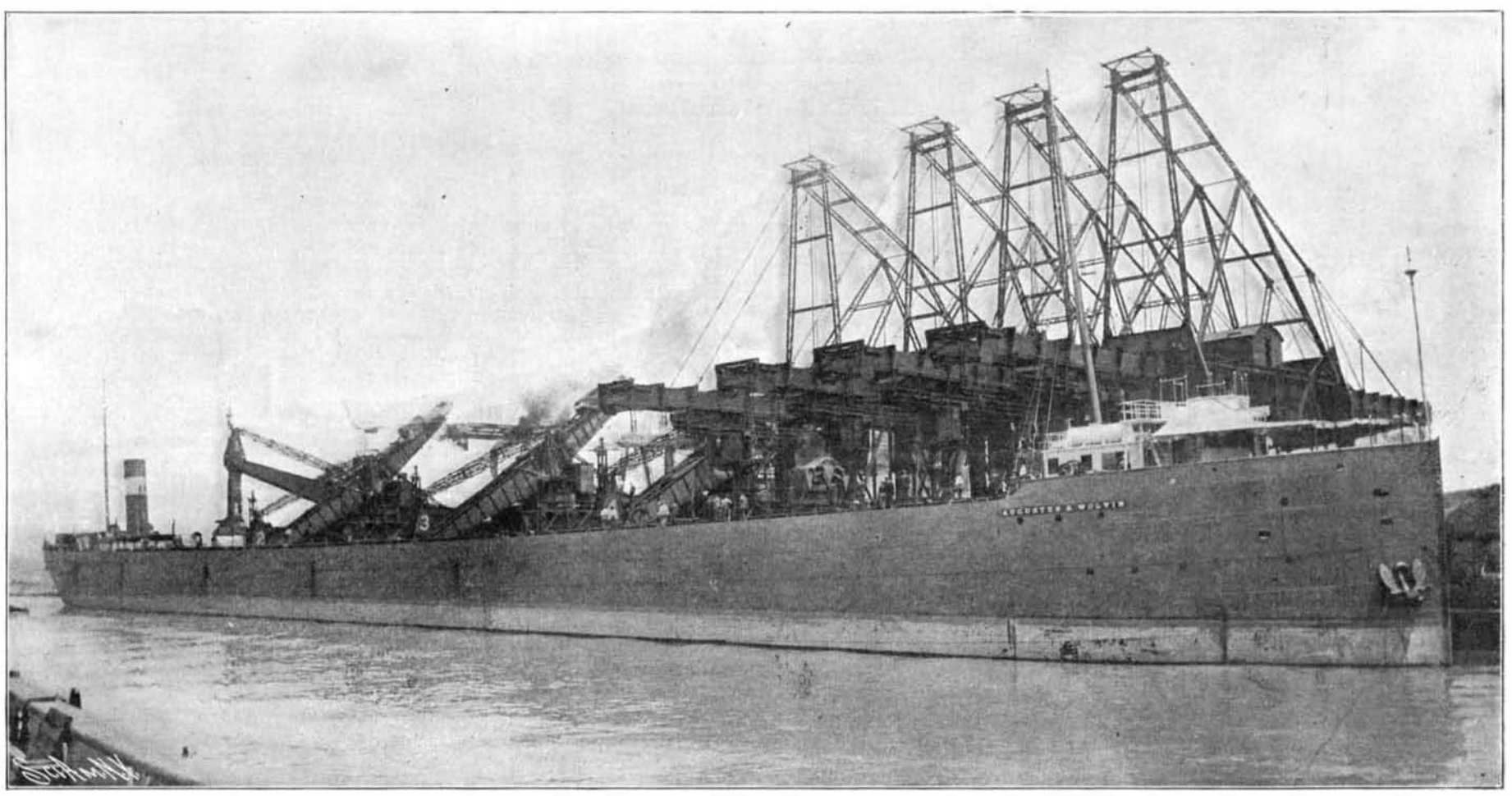
In the absence of noise and smoke the electric locomotive has an advantage that has long been recognized. This feature alone has caused its adoption in certain cases, such as switching around buildings, in city streets or in tunnels. The New York Central and the Baltimore & Ohio locomotives are prominent examples in which this feature would have forced the adoption of the electric locomotive, even if no consideration of economy of operation had been present.

The electric locomotive lends itself to a greater variety of service than the steam locomotive, and has a greater range of capacity. In the steam locomotive the generating station or source of power, the boiler and the fire box, are seriously limited by considerations of space between the drivers and height of center of gravity above rail head, considerations which do not apply to the electric locomotive.

An electric locomotive can be built in several units, or sections. The 160-ton B. & O. locomotive described in these columns some time ago is a characteristic example of this type of construction. One section can be used for a light train, or the several sections coupled together can be operated by a single crew for trains of greater weight. Any such double heading with steam locomotives can be accomplished only by two independent units with separate crews.

The electric locomotive is able to use the power it exerts to better advantage, due to the uniform torque on its drivers, and the perfect control of its speed.

The application of electric traction to trunk line service has not yet been developed to any extent on account of the relative infrequency of service and the enormous expense of sub-stations and distributing systems for operation at the usual potential of 500 or 600 volts. The single-phase alternating current motor, which the General Electric Company has recently de-



THE FOUR HULETT CLAM-SHELLS AND THE FOUR ELECTRICAL BROWN CONVEYERS AT WORK UNLOADING THE ORE-CARRYING STEAMER "AUGUSTUS B. WOLVIN" IN RECORD-BREAKING TIME.

veloped, makes it possible seriously to consider the installation of electric locomotives for trunk line service. With this alternating current motor it is possible to deliver current to moving units at a pressure of 2,000 to 3,000 volts on the trolley, with the effect of reducing the amount of current to be handled by the moving collectors and of increasing the radius of distribution without a prohibitive cost of distributing conductors.

The final possibilities of this type of motor are as yet unknown, but in the electrification of trunk lines, particularly in regions where coal is expensive or water power available, is to be found the field for which the alternating current, single-phase railway motor is peculiarly suited.

The New York Central locomotives may be regarded as a noteworthy advance in the adaptation of the electric locomotives to the needs of high-speed trunk line service. They differ from most of those that are at present in use throughout the world in that they are to be used for high-speed passenger service rather than for freight service. They are also noteworthy in regard to the design and construction of the electrical equipment. The motors are bipolar gearless, the magnetic circuit, the field windings and the motor fields being integral with the locomotive frame, and spring supported, while the armature is mounted directly on the axle and is held centrally between the poles by means of the journal boxes sliding in finished ways in the side frames. The pole pieces are vertically tangential to the armature, so that the armature is free to move between them with ample clearness on the sides.

The conditions of service under which this locomotive is to operate are as follows: It is capable of making two regular successive trips of one hour each between the Grand Central station and Croton, a distance of 34 miles, with a total train weight of 550 tons, a single stop in each direction and a layover not exceeding 20 minutes. In addition a similar schedule can be maintained with a lighter train, making more frequent stops. Finally, with a total train weight of 435 tons it will make the run from the Grand Central Station to Croton, without stop, in 44 minutes, and with one hour layover will keep up this service continuously. This last is the schedule of the Empire State Express, although the latter is a somewhat lighter train.

The principal dimensions of the locomotive are as follows:

Weight of locomotive (with 9,000-pound heater), 93 tons; number of units, 1; horse-power rating of each motor, 550 horse-power at 625 volts; gearless. Arrangement of wheels, 8 driving wheels, and 4 leading wheels (of the latter, two at each end). Number of motors, 4. Weight on driving wheels, 66¾ tons. Total tractive effort at full load on motors, 22,000 pounds. Total tractive effort at starting up, assuming 25 per cent tractive coefficient, 33,500 pounds. Gage, 4 feet 8½ inches. Diameter of driving wheels, 44 inches. Diameter of truck wheels, 36½ inches. Length over all of locomotive, 37 feet 3 inches. Extreme width of locomotive, 10 feet 2 inches. Height to top of cab, 13 feet 11½ inches. Total wheel base (center to center of outside wheels), 27 feet. Wheel base of driving wheels, 13 feet. Driving wheel journal bearings, 14 inches x 7 inches diameter. Truck journal bearings, 12 inches x 6½ inches diameter.

The Sprague-General Electric multiple-unit control is used on this locomotive. There are two master controllers in the cab, so placed that the operating engineer looking ahead will always have one of these under his hand. The control system permits two or three locomotives to be coupled together in any order in which they happen to come, and to be operated as one unit by the engineer in the leading cab.

The control system is also semi-automatic in its action, as it provides check on the rate of acceleration of the train, which the engineer cannot exceed, while he may accelerate at any slower rate if he so desires. Should two locomotives break apart, the control current will be automatically and instantly cut off from the second locomotive without affecting the ability of the engineer in charge to control the front locomotive under his charge. The control system is designed for a minimum of 300 volts and a maximum of 750 volts.

The locomotive is provided with all the usual accessories of a steam locomotive, including an electric air compressor to furnish air for the brakes; it will have whistles, a bell and an electro-pneumatic sanding device, and electric headlights at each end. The interior of the cab is also heated by electric coils.

The locomotive has a maximum rating of about 2,800 horse-power, that is, a capacity in both output and draw-bar pull about 50 per cent greater than that of the largest steam passenger locomotive now in service. With a light train it will develop speeds up to 75 miles per hour, and with heavier trains similar speeds can be attained by coupling two or more locomotives together and operating them as a single unit.

The locomotive is in every respect a modern type of electric apparatus, and in simplicity and accessibility of its parts, as well as in the provision made to insure continuous operation with the minimum chance of failure, it marks a new and successful type of locomotive.

The International Railway Congress for 1905.

In May, 1905, the International Railway Congress will be held at Washington. The American Railway Association has unanimously voted $35,000 to defray the expenses connected with the meeting of the congress in this country. Congress has appropriated $400 for the same purpose.

The list of questions to be discussed at this coming session covers almost every phase of railway engineering. Section 1 will consider "Way and Works," and will devote its attention to wooden sleepers or cross-ties; the selection of species of timber used; and processes of preservation. Rails for lines with fast trains will also receive attention, such subsidiary considerations as the cross-sections of heavier rails, manufacture and inspection, the best metals to use for rails and ties, nickel alloys, rail joints, improvements in suspended joints, experiments with supported joints, experiments with a view to reducing the number of joints, and methods of preventing creeping being also discussed. Other subjects which will receive consideration are improved rail crossings (frogs), and concrete and embedded metal.

In Section 2 "Locomotives and Rolling Stock" is the subject assigned. Locomotives of great power, pooling locomotives, automatic couplers, and electric traction will be treated.

Section 3 will receive for its subject the "Working of Railway Lines," the topics including the lighting, heating, and ventilation of trains; automatic block systems; baggage and express parcels, and suburban traffic.

In Section 4, general topics which could not very well find a place in other sections will be discussed. Among these may be mentioned slow freight rates, bookkeeping, duration and regulation of work, and provident institutions.

Section 5 will consider light railways, and particularly the influence of light railways on the main lines, direct financial co-operation by public authorities, organization of a cheap service on a main railway's branch lines which carry little traffic and on light railways, and traffic conveyed by automobiles.

The Santos Dumont Prize for a Two Days' Voyage in the Air.

It will be remembered that Santos Dumont founded a prize of $800 just after he had won the Henri Deutsch prize by passing around the Eiffel Tower in his airship. The prize was to be awarded to the aeronaut who would start from the St. Cloud aerostatic park and pass around the Eiffel Tower, but without any limit as to time. Up to the present there has been no competition for the prize, as there are in fact but few airships in the field and these are more or less in the experimental stage. Accordingly, at the last meeting of the Aero Club, Santos Dumont decided to employ the prize in another way and it is now to be awarded for the first voyage lasting forty-eight hours to be accomplished with a spherical balloon or with any kind of airship. The prize can only be obtained by a member of the Aero Club and the start is to be made in the presence of two other members. Before engaging in his experiments with airships, Santos Dumont became an expert pilot of spherical balloons and is still interested in the question. It is therefore by way of encouraging this branch of aerial navigation that he offers the prize. No doubt it will not be an easy matter to realize an airship either lighter or heavier than air which will be able to remain forty-eight hours in the air. But such a performance, although difficult, can be carried out by a spherical balloon. No doubt this offer will be followed by a number of trials with ordinary balloons and will awaken renewed interest in the question of endurance.

The Current Supplement.

The English correspondent of the Scientific American opens the current Supplement, No. 1506, with an article on the Coolgardie Water Works, most fully illustrated. The Belgian correspondent of the Scientific American writes instructively on Thermo-Electric Receivers for Wireless Telegraphy and Telephony. Emile Guarini, by a series of valuable experiments, has endeavored to determine the influence of the electric tramway line, and especially of the rails through which the current returns to the generating station, upon a relay formed of a magnetized needle capable of revolving in a vertical plane and dipping at the time of the deflection into the mercury cups in which ends the local current, such relay being placed in ordinary practice a few inches from the ground. The results of his experiments are described in an article published in the Supplement. "Wool Conditioning in England" is the title of an article which shows how deception and fraud are detected in the British woolen and worsted trades. Charles E. Munroe discourses on the relations of technical chemistry to the other sciences. Dr. Somerville's excellent dissertation on scientific agriculture is concluded.

Automobile Notes.

The first practical demonstration of what an automobile can do, if fitted with steel-flanged wheels, and run on a railroad track, was made recently by Mr. Charles J. Glidden, of Boston, Mass. Mr. Glidden is on an auto tour of the world, in the course of which he has already covered over 20,000 miles, or about one-half the distance which he intends to cover in all during several months of the next three years. In the course of this trip he found it necessary to cross the American continent. The first 1,733 miles of this distance were traversed over the roads at an average speed of 18.13 miles an hour, while the second stage of 1,800 miles, from Minneapolis, Minn., to Vancouver, was run over the rails of the Canadian Pacific Railway. The 24-horse-power Napier car which Mr. Glidden drives was run as a special, and was in charge of a conductor all the way. The 1,800 miles were traversed in 60 hours' running time, and the Gliddens say that 40 miles an hour can be made on the rails without any discomfort. The general average speed throughout the trip was about 30 miles an hour, and the gasoline consumption was about half that needed for locomotion over the roads. The trip has demonstrated the applicability of the automobile to railroads, and probably in the near future railroad superintendents will have large and powerful automobile inspection cars propelled by gasoline motors, instead of the more cumbersome steam cars now used for this purpose.

A new type of automobile for transporting mail matter is now on trial at Paris under the supervision of M. Berard, Secretary of Posts and Telegraphs. The new cars are electromobiles and will be used for carrying the mail between the central post office and the various branch offices throughout the city. The present type of electric car, brought out by M. Dubois, has now been definitely adopted by the authorities and will soon replace the old postal wagons. By the middle of October it is proposed to place as many as 15 of them in service. The main advantage to be gained with the new cars is a considerable saving of time in making the trips between the offices; an earlier distribution of mail than heretofore can thus be made, and the hour of collecting, especially in the outlying quarters of the city, can be made later. The new system will bring about an improvement in collecting the mail which has been needed for a long time past. It is expected that the cars will run at a speed of 12 or 15 miles an hour within the city, but they can be run as high as 25 miles. Their total weight is less than 5,000 pounds. The wagon body, chassis, and motor weigh 2,000 pounds, the accumulators 1,250, two men 300, and the net load carried by the car is 1,400 pounds. A greater quantity of mail matter can be taken on the new cars in the proportion of 3 to 2. The electric motor is placed at the center of the chassis, and drives the rear wheels by chains. The accumulators will be charged by a special plant, which is being fitted up in the central post office.

A large number of motor bicycles were assembled on the occasion of the first annual race for the International Cup offered by the Motocycle Club of France. The cup was offered in order to promote the interests of motor bicycles and to bring together the leading makes of the different European countries, and the event was somewhat analogous to the Gordon Bennett Cup race as to its organization. The different nations were represented by 3 English makes, 3 French, 3 German, 2 Austrian, and 1 Danish. As to the types of machines, there were 5 two-cylinder machines and 7 single-cylinder. The event took place on the route near Dourdan, to the south of Paris; and the competitors were required to make five rounds on a circular route, or 125 miles in all. They started off at 20-minute intervals, led off by Lamberjack on a Griffon (French) machine. To the astonishment of the chauffeurs, the route had been plentifully sown with nails by some miscreants, and in many places the ground was entirely covered with them. This soon put the runners *hors de combat*, but it was not long before a volunteer brigade was organized and it swept the route clear with branches of trees. The race under these conditions was not the brilliant success it might have been. Most of the runners had to stop and repair their tires several times, and but few were able to finish. Demester (French) came in first, having made the five rounds in 3 h., 43 m., 43 sec. Next came Toman (Austrian) who had broken his saddle. The third was Inghilbert (French), who covered the last round in 39 m., 23 sec. Then followed Lamberjack (French) and Wondrick (Austrian). It was first proposed to annul the race, seeing the unfavorable conditions under which it was run, but the International Commission decided that it would hold good. The cup therefore belongs to France, for this year at least.