

THE ATLANTIC OCEAN AND THE "AMERICA" CUP.

The accompanying composite picture showing the new challenger for the "America" cup, "Shamrock III.," under both her cruising ocean rig and her racing rig of 14,500 square feet, naturally suggests the question as to whether the intervening three thousand miles of ocean water between England and America has been anything of a handicap to the challengers in their long half-century of plucky struggle to recover the cup—as many people assert that it has—or whether this supposed handicap is one of the many fictions associated with international cup racing which will not down, but present themselves with persistent regularity at every successive series of contests.

The theory is that the challenging yacht has to be built of sufficient strength to stand the stress of the heavy gales which she is liable to encounter in crossing to this side of the water; and that to give her this margin of strength she must necessarily be built of somewhat heavier scantling, and her plating must be of greater thickness, than is necessary in the case of the home yacht, which is nursed in the sheltered waters of Long Island Sound, and is at all times carefully tied by leading strings to its home cradle at the Bristol yard. Is there anything in all this? Candidly we have to confess that we think the handicap does not amount to much; possibly just enough to constitute the few minutes' handicap that means the difference in these days between winning and losing the series of races. The turbulent Atlantic Ocean puts a limit upon lightness of construction; it also puts a limit on exaggerations of form, for it is certain that no yacht of the scow type like "Independence" would risk the ocean passage. We have all heard how her bow plates were started, as she was being towed in half a gale round Point Judith, when the boat was in such a bad way that the question of abandoning her was raised. How "Reliance" would fare under similar conditions is one of the questions that all of us who are watching the defense of the cup are asking with more or less anxiety. It was hoped that the trials off Sandy Hook would have furnished the desired test of her broad, flat bow, which, while not so flat as that of "Independence," is still of such a very pronounced scow-type that as she is swinging round from tack to tack in a hammer to windward, the impact of the seas will be extremely heavy and will prove a severe tax upon the light framing and plating in the region of the waterline. It was noticeable when the yacht was hauled out at City Island that a large number of the rivets under the bow, and the butt joints of the plating, were clearly defined by circles and lines of red rust. Now, since the plating and the rivets are of bronze, the rust could not have come from them, but must have worked through from the nickel-steel frames on the inside of the hull. It could only have come from the frames by virtue of the fact that the whole structure was "working" sufficiently to allow the salt water to seep through at the rivets.

Now, "Reliance" has never experienced anything stronger than a fresh summer breeze; and if her hull is working under these conditions it becomes an interesting question as to what will happen when that tremendous sail plan is driving her at full pressure into a heavy sea off Sandy Hook. This condition, however, may never occur, and the great boat may be favored with those moderate winds and seas under which she would seem, on her showing so far, to be perfectly certain of defeating her coming antagonist. At the same time the interesting question is raised as to whether a boat of this extreme type and exaggerated rig would safely make the westward passage. We think not. On the other hand, it is claimed, with much

reason, that the strains to which a vessel is subjected when she is being driven to the utmost under her towering stress of racing canvas are fully as great as any that she may meet when jogging along in a gale of wind under snug cruising canvas. Probably in a thrash to windward, such as occurred in the famous race between "Vigilant" and "Valkyrie II.," the hulls are about as severely tested as they would be if hove to in an Atlantic gale. On the whole, however, it is probable that yachtsmen, and those who go down to the sea in ships generally, will be agreed that the three thousand miles stretch of the stormy Atlantic will always prove to be a very real handicap to the challenger, especially if the passage must be made from east to west against the prevailing winds.

THE PARIS-MADRID AUTOMOBILE RACE.

SPECIALLY PREPARED FOR THE SCIENTIFIC AMERICAN BY OUR PARIS CORRESPONDENT.

The Paris-Madrid race, which was held on the 24th of May, has certainly been a unique event in the history of the automobile. Never before has there been shown a greater interest on the part of the public in

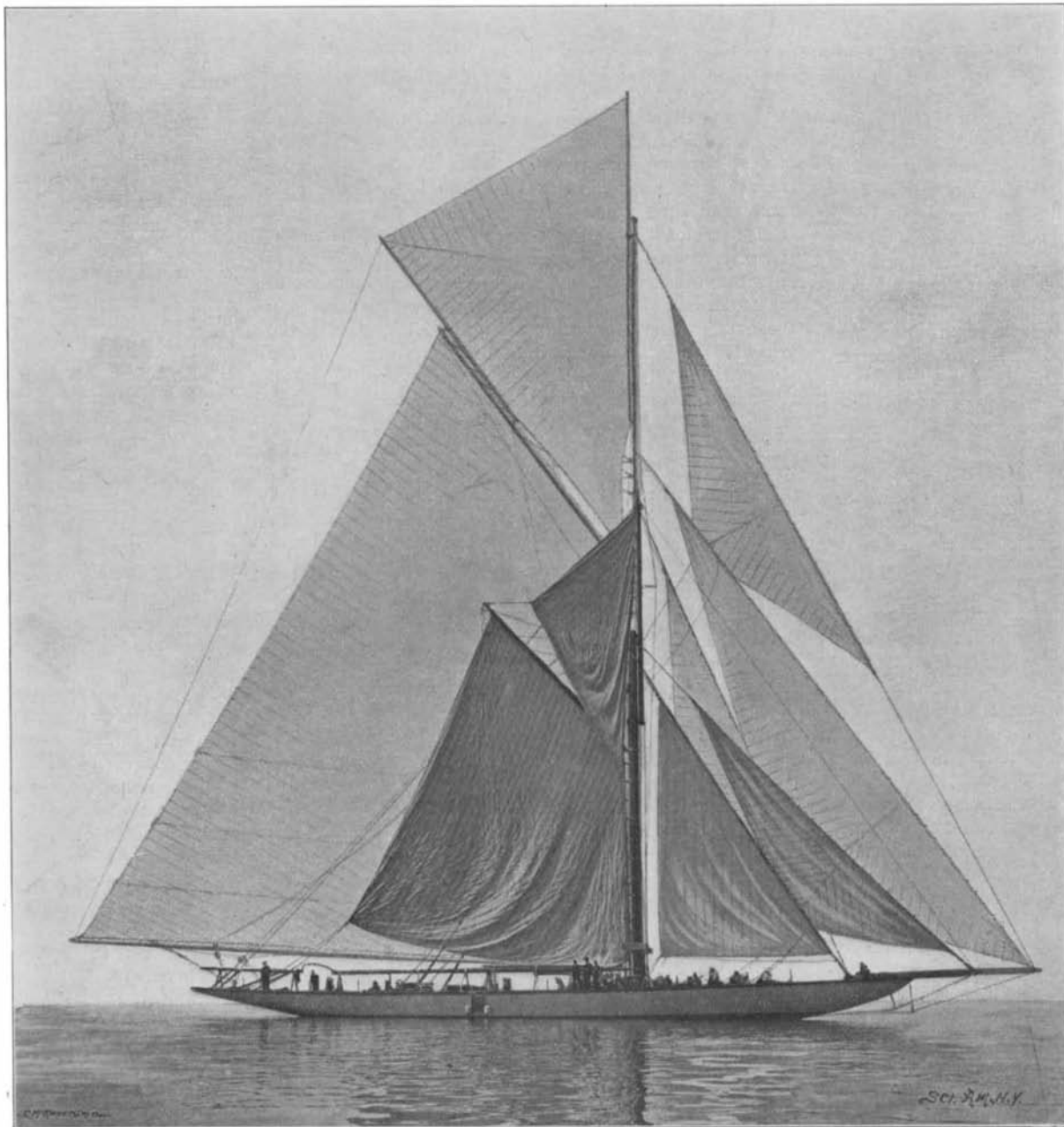
the tapering front and offer but little resistance to the air. These cars were especially remarked for their handsome lines. They have a stable and solid appearance, mainly due to the wide spacing of the wheels and the low position of the body, which rests near the ground. Among the conductors of the Mors cars were Fournier, Gabriel, Augieres, W. K. Vanderbilt, Jr., and others, some of whom are of the first class and have made many records, while the remainder are very close to them in skill and *sang froid*. Vanderbilt and his white car attracted a great deal of attention, as he was one of the few Americans to enter the race. The Panhard & Levassor cars were also among the most prominent. They have not changed much in form since last year, but have been considerably improved; the motor is of the same size as that used in the Paris-Vienna race, but can now furnish 70 horse power. The cylinders are of steel, surrounded by copper water jackets. The inlet valves are now operated mechanically, and another improvement is a new type of carbureter, besides a larger flywheel on the motor. The chassis is built of pressed steel. This year's type is remarkable for the unusual position of the motor, which is inclined toward the front at a considerable angle. This has been

done in order to lower the center of gravity as much as possible and at the same time use a flywheel of large diameter, to give greater weight. So it was decided to tilt the motor toward the front, thus lowering one end while the rear end carrying the flywheel is higher up. The seats are placed near the middle. The crank case, of square form and sloping toward the front, is terminated by the radiator, which has a ventilating fan placed behind it. The Panhard cars were mounted by a number of first-class conductors, René de Knyff, Henri and Maurice Farman, and Baron de Crawhez, who have distinguished themselves in preceding years, besides Heath, Rolls, Teste, and others not far behind them.

The two favorites among the French racing cars were closely rivaled in interest by the German Mercedes car, and the Daimler Company made a special effort this year to construct a machine of great power and high speed. Although the Mercedes machines have a high reputation in general, it is only this year that a racing car properly so-called has made its appearance. Last year although not so powerful as their competitors, some of these machines were much more solidly built, and owing to the breakdown of their competitors came

very near winning the Paris-Vienna race with Zborowski and De Forest at the wheel.

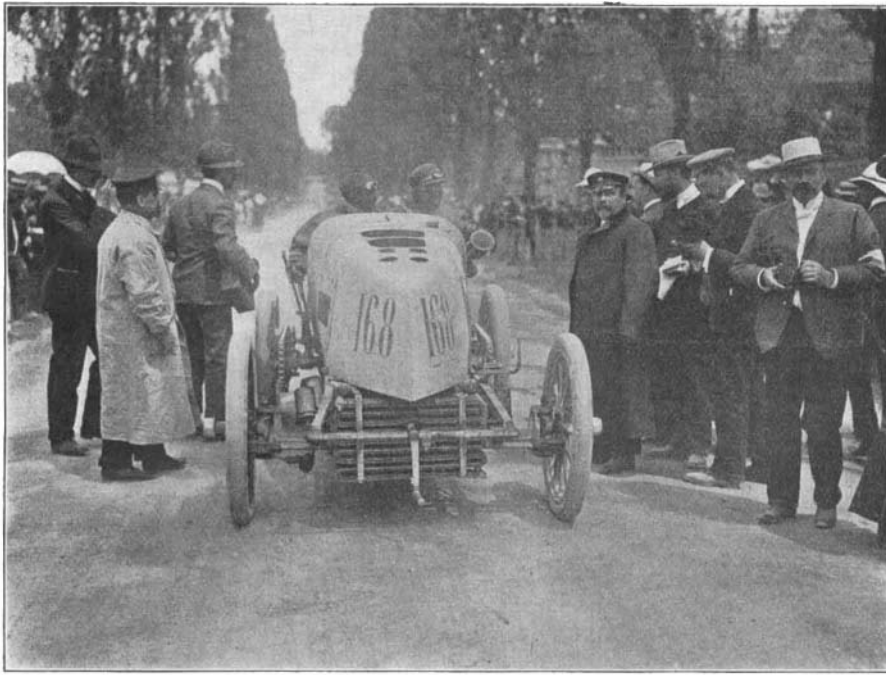
Great attention was therefore attracted by the new 60 and 90 horse power Mercedes cars which arrived from Canstatt a few days before the race. These two types are the same in size, differing only in the motor. The 90-horse power cars are among the most powerful machines yet built. They have a somewhat square appearance and the seat is far in the rear, just over the axle. The four-cylinder motor represents all the newest ideas, and among other points has a double inlet valve which is mechanically operated. The motor is protected by the long box front, which is terminated by the honeycomb radiator. That this firm were the first to introduce, with its air-fan behind it. The body lies very low, and the wheels have a remarkable spread. The Mercedes cars were mounted by Werner, Baron de Caters, Degrais, Jenatzy, Warden, Foxhall Keene, Mr. Terry, the well-known American chauffeur, and others. After the favorites comes the De Dietrich racer, which was remarked for its pointed shape. These machines are among the newest in the field, but they have already made a good record. The four-cylinder motor gives 45 horse power, which can be pushed to 60. The radiator is mounted just beyond the pointed front



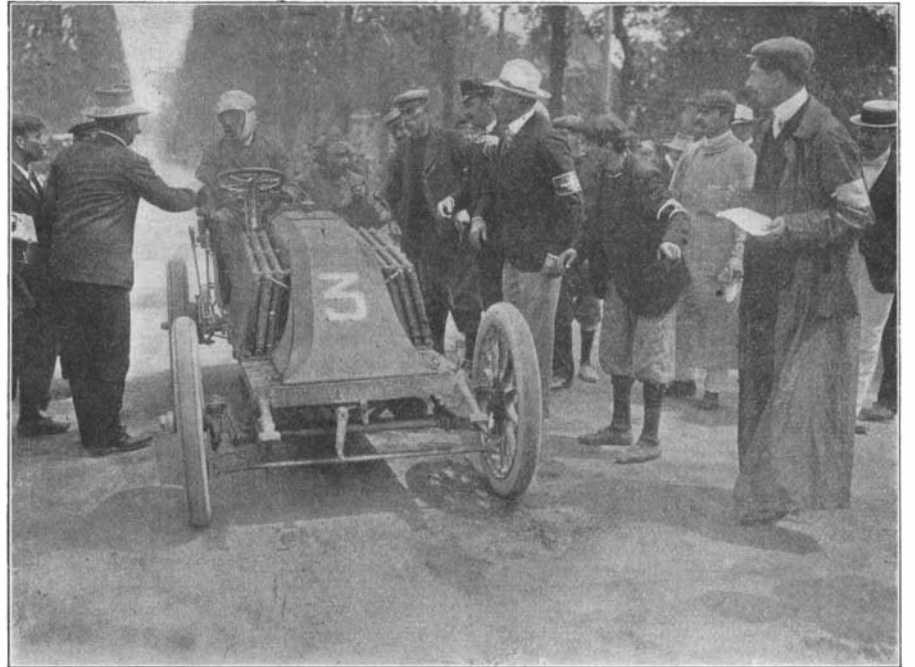
"SHAMROCK III." IN HER OCEAN AND RACING RIGS.

an automobile race, and it is estimated that at least two million persons were ranged along the route at different points between Paris and Bordeaux. The event is also remarkable for the high power and great speed of the new machines, some of which undoubtedly reached 80 miles an hour. The race led off in the most brilliant manner, having no less than 228 starters, but after the finish of the Bordeaux stage, which occupied the first day, the news came of a number of serious accidents, including the death of Marcel Renault, and the race was not allowed to proceed further. As it is, however, it has been a great event and one which will long be remembered.

The Mors machines have the form of an upturned boat, or a torpedo shape with sharply pointed front, which gives them a handsome appearance. The wheels are spread wide apart, and the radiator is placed between the front wheels and underneath the body of the car. The four-cylinder motor gives 80 or 90 horse power, with mechanically operated valves and magneto ignition. The Mors racers have a transmission which allows four speeds, with direct driving at the high speed. The rear wheels are driven by chain gearing. The driver's seat is placed far in the rear, and the chauffeurs are thus almost entirely concealed behind



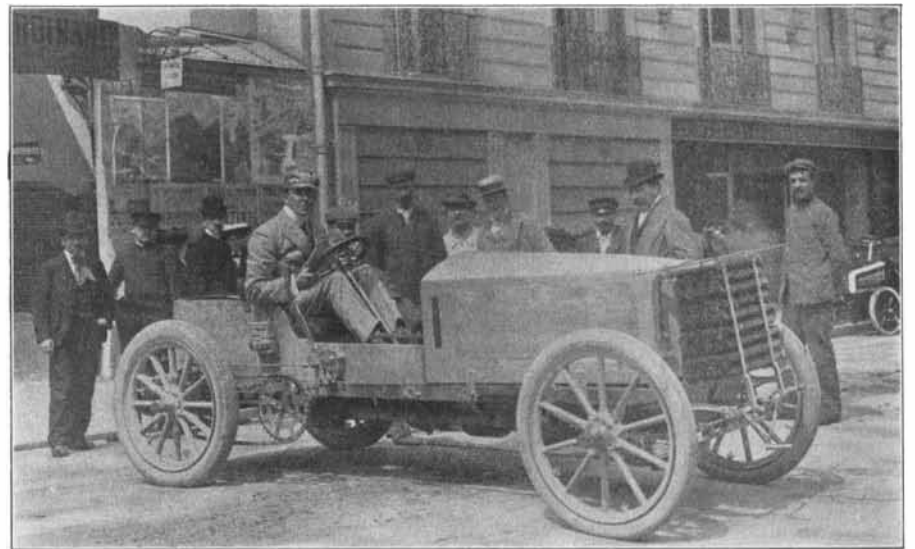
Finish at Bordeaux. Arrival of Gabriel, the Winner.



Congratulating Louis Renault, who was the First to arrive at Bordeaux, making the best time after Gabriel, and winning the Light Car Class.



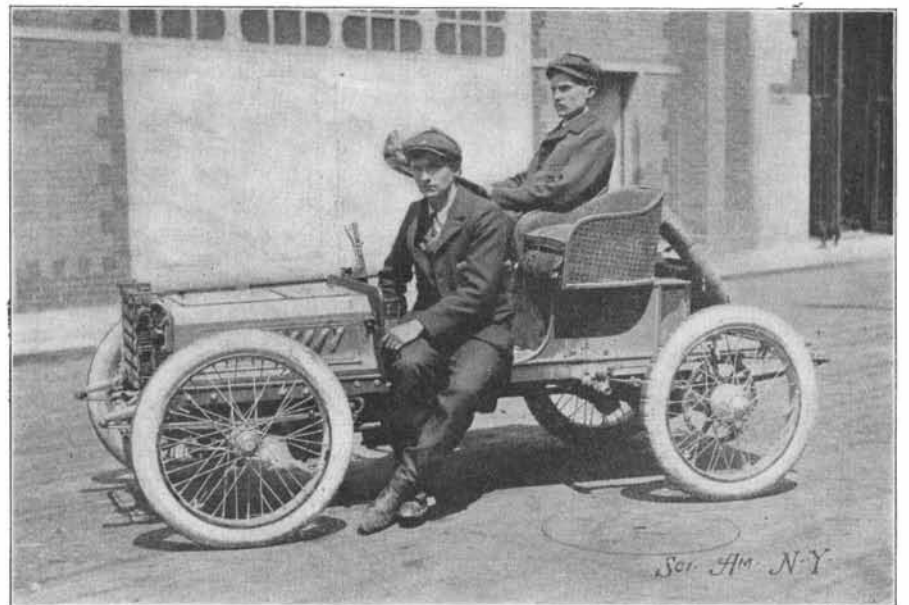
Salleron Mors Racer, which took the Third Place.



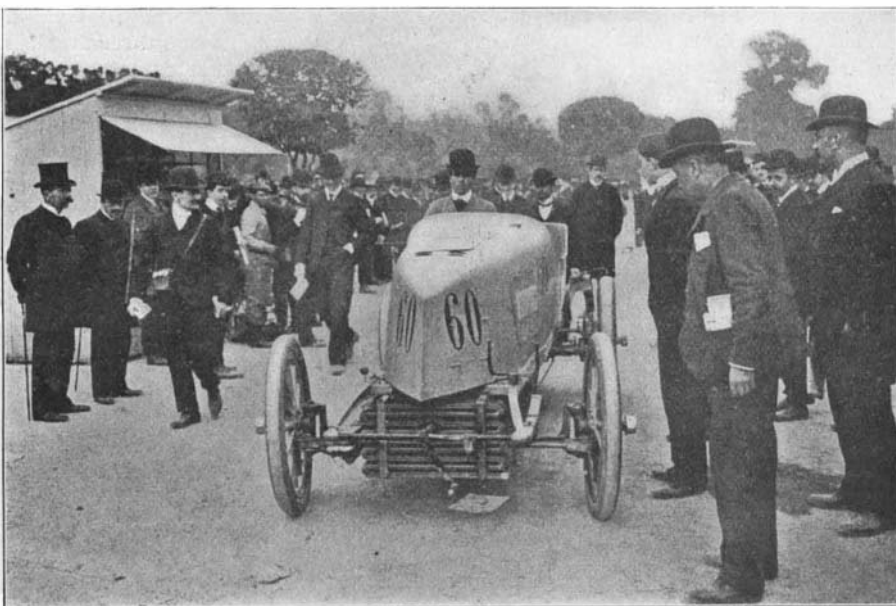
Jarrott on His De Dietrich Car, took the Fourth Place.



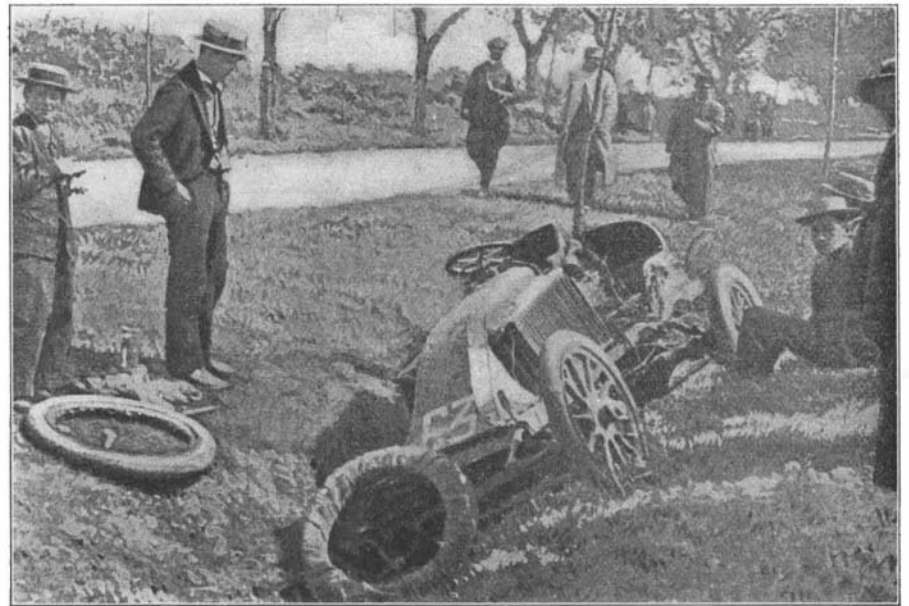
The Remnants of Mr. Terry's Machine.



Masson and His Clement Machine, Winner in the Voiturette Class.



W. K. Vanderbilt, Jr., on His 80 H. P. Mors.



The Wreck of Marcel Renault's Car. The Vehicle is Turned Completely Around, so that the Wreck Faces Paris. M. Renault was killed.

THE FATAL RACE FROM PARIS TO MADRID.

of the car. Among the drivers were Lorraine Barrow, Stead, Jarrott—who won the Ardennes Circuit race last year—Gras, and others. Madame Du Gast, who had the remarkable courage to enter the high-speed race, having already distinguished herself on other occasions, was greatly remarked with her long pointed racing car. The Charron, Girardot & Voigt racer has the same general appearance as last year's type with a long box front ending in a radiator. One of this year's improvements is a newly designed gear-box with direct transmission at the highest speed. Charron, with his two associates, who each mounted a car, were of course among the favorites. Alcohol was represented by a 110-horse power car of the Gobron-Brillié make, which was no doubt the most powerful in the race, but did not succeed in taking a good place. The motor has four cylinders, with two pistons per cylinder working in opposite directions. Steam was championed by the Serpollet and Chaboche cars, and of the former two new types were completed just before the race. Two of these machines give 20 horse power and the other two 40 horse power. These cars have somewhat the same construction as the racers used at Nice this year, but the exterior is considerably modified. The pointed front contains the water and gasoline tanks; the motor is placed in the center of the chassis and the boiler is now quite in the rear. Among the light-weight cars the Renault attracted the most attention as the winners of the Paris-Vienna race last year. These machines keep about the same design as before, with their triple-radiator mounted on each side of the pointed front. Marcel Renault and his brother Louis each mounted a machine. Another favorite was the Darracq light car, and this year's type is of low and square form, with a box front terminated by a radiator and containing a 4-cylinder, 30-horse power motor.

The start took place from Versailles shortly after 3 o'clock A. M., on the 24th of May, and no less than 200,000 persons left Paris during the night to reach the town or some point farther along the road. The continuous procession of cyclists in innumerable file, each carrying a Chinese lantern, together with the automobiles, nearly all of which had turned out naturally to see the event, gave a festive air to the occurrence. It was intended to run the first stage to Bordeaux that day, or 331.2 miles, the next to Vittoria, 127.2 miles, and the last to Madrid, 325.8 miles, making a total of 784.2 miles. Over 50 tourists had left Paris a few days before on their way to Madrid to see the finish as well as to test the endurance of their machines.

The machines were started one after the other in the order of their inscription, which had therefore no particular significance, as it was only the time occupied in making the run that counted. However, many of the leading champions had the first numbers. Shortly after 3 o'clock all was ready for the start, the road was cleared and the competitors were drawn up in file awaiting their turn. First in order came Jarrott on his De Dietrich car. At the signal given by the timekeeper, Jarrott came up to the line with his formidable machine ready to start. But it was still too dark to see the road plainly and so it was decided to wait a quarter of an hour longer for better light. After Jarrott came René de Knyff on his Panhard, then Louis Renault in his light car, and not far behind was Fournier, mounted on a Mors racer, then the long file of competitors. At 3:45 the signal for the start was given and Jarrott led off with a tremendous rush, disappearing in a cloud of dust. The other cars followed at intervals of one minute, and there were as many as 139 starters in the heavy and light weight classes. After these had all passed came the turn of the voiturettes, which were 36 in number, followed by 53 motor-bicycles which were started two by two in order to gain time. The greater number of spectators had left Versailles in order to see the cars pass at full speed, choosing the best places for watching the racers, some taking their position by a long stretch of road, others preferring the excitement of seeing the cars round a sharp turn at full speed. One of the best points lay at the foot of a long slope of good road between Versailles and Chartres, where the machines could be seen approaching from the top of the hill almost like specks in the distance, coming down with a terrific rush and passing at lightning speed. The sight was most impressive, and such high speeds have never before been attained under similar conditions. Unfortunately it will no doubt be a long time before such a performance is seen again in France.

Renault was the first to arrive at Bordeaux, at 12:14:0, followed by Jarrott, Gabriel, Salleron, Baras, Baron de Crawhez, etc. The race was won by Gabriel, who covered the distance in 5 h. 13 m. 31 s. Renault took second place in 5 h. 39 m. 59 s., which was a considerable surprise, as it was not expected that a light weight car would gain over so many of the more powerful racers.

The following is the official time of the winners, deducting for certain parts of the route where high speed could not be made, as in some towns and villages, which were not counted in the race. 1. Gabriel on a Mors car, time 5 h. 13 m. 31 s. 2. Louis Renault, Renault

light car, time 5 h. 39 m. 59 s. 3. Salleron, Mors car, 5 h. 46 m. 01-5 s. 4. Jarrott, De Dietrich car, 5 h. 51 m. 55 s. 5. Warden, Mercedes car, 5 h. 56 m. 30-4-5 s. 6. De Crawhez, Panhard car, 6 h. 1 m. 8-2-5 s. 7. Voigt, Charron, Girardot & Voigt car, 6 h. 1 m. 9-1-5 s. 8. Gasteaux, Mercedes car, 6 h. 8 m. 0 s. 9. Ach. Fournier, Mors car, 6 h. 11 m. 39 s. 10. Baras, Darracq light car, 6 h. 12 m. 49 s. 11. Rougier, De Dietrich car, 6 h. 16 m. 7-4-5 s. 12. Moutier, De Dietrich car, 6 h. 17 m. 54-1-5 s., etc.

In the different classes, heavy cars, light cars, voiturettes and motorcycles, the order is as follows: For the heavy cars the order is the same as above, leaving out No. 2 (Renault light car) and No. 10 (Darracq light car). For the light weight class the winners are: 1. L. Renault, Renault car, 5 h. 39 m. 59 s. 2. Baras, Darracq car, 6 h. 12 m. 49 s. 3. Page, Decauville car, 6 h. 19 m. 8-1-5 s. 4. Hemery, Darracq car, 6 h. 52 m. 33-1-5 s. 5. Pellésson, De Dion car, 7 h. 12 m. 43-1-5 s. 6. Théry, Decauville car, 7 h. 13 m. 16 s. 7. Edmond, Darracq car, 8 h. 0 m. 34-1-5 s. 8. Sinholle, Darracq car, 8 h. 4 m. 7-2-5 s. 9. Osmond, Darracq car, 8 h. 29 m. 40-2-5 s. 10. Bardin, De Dion car, 8 h. 30 m. 13-3-5 s., etc. The winners in the voiturette class are: 1. Masson (Clement voiturette), 7 h. 19 m. 57-1-5 s. 2. Barillier (Geo. Richard), 7 h. 39 m. 03-5 s. 3. Wagner (Darracq), 7 h. 47 m. 12-1-5 s. 4. Combiér (Geo. Richard), 8 h. 7 m. 26-1-5 s. 5. Holley (De Dion), 8 h. 22 m. 19 s., etc. For the motor bicycles the order is as follows: 1. Bucquet (Werner), 8 h. 57 m. 1 s. 2. Demester (Griffon), 9 h. 3 m. 44 s. 3. Jollivet (Griffon), 9 h. 25 m. 54-2-5 s. 4. Cissac (Peugeot), 9 h. 39 m. 36 s. 5. Lanfranchi (Peugeot), 9 h. 50 m. 40 s., etc.

The first honor therefore falls to Gabriel with his Mors racer, and our engraving shows the winner as he crosses the line at the finish. Louis Renault, with the light-weight Renault car, confirms the victory of this type in the Paris-Vienna race, making the second best time, and the photograph shows him as he arrives at Bordeaux. The Renault car thus takes the first place in the light-weight class. The Mors racers also carry off third place with Salleron, which gives them a decided victory, even though some of their best drivers were not able to finish. Henri Fournier and Augières both had accidents *en route*, but were fortunately not injured, while Vanderbilt could not finish on account of a punctured tire. The Mors cars also took ninth place with Achille Fournier. The De Dietrich wins its laurels against the older machines, taking fourth place with Jarrott, while the Mercedes, although they certainly made a high speed on the road, did not come up to the general expectation, and only reached fifth place with Warden. The Panhard cars had still worse luck, as most of their best conductors had been disabled on the road owing to accidents, the Farman brothers and René de Knyff being *hors de combat*. The Panhard cars thus take sixth place with Baron de Crawhez. Another new machine to take a good place is the Charron, Girardot & Voigt, which now shows that it must be counted among the leading types, as it reached seventh place, mounted by Voigt. One of the Mercedes cars took eighth place, then came a Mors, followed by a Darracq light-weight car, which thus gained over the majority of heavy-weights. Most of the above mentioned machines are illustrated in the current issue of the SUPPLEMENT, where a more detailed description of the various cars and the race itself will be found.

In the light-weight class Renault comes first in order, then the Darracq, both these cars making a good record. Then comes a Decauville, with another Darracq, and fifth a De Dion-Bouton. The voiturettes are led by Clement, followed by Geo. Richard and Darracq. Only eight motor-bicycles were able to finish. A Werner takes first place, mounted by Bucquet, followed by two of the Griffon type and two Peugeots.

As to speed, the results of the race were a surprise to all. It was expected that in view of the recent records which have been made on the road, the distance from Versailles to Bordeaux, or 331 miles, would be covered this year in 5½ hours, which would be a remarkable performance, since the Southern Express takes 7 hours to make the distance. But in fact the winner, Gabriel, covered the ground in 5 hours 13 minutes, which represents an average speed of 63.45 miles an hour, and this was kept up over bad stretches of road, over drains and crossings and the numerous obstacles which were encountered. As to the highest speeds which were made by the new cars, there is little doubt that many of them ran as high as 70 or 80 miles an hour over parts of the road, and it is probable that never before have such high speeds been attained by automobiles.

It is to be regretted that this splendid performance was marked by a number of accidents, both to the chauffeurs and the spectators of the race, and some of these were of such a grave character that the authorities were obliged to stop the race at Bordeaux, fearing that further damage would be done along the remainder of the route. The most painful accident was that of Marcel Renault, which resulted in the death of this well-known chauffeur and winner of the

Paris-Vienna race. It appears that Renault was following close behind Théry, not far from Bordeaux, and waited for the most favorable moment to pass him. At this point were two turns in the road which are rather dangerous. In trying to pass Théry, Renault kept up full speed, but made too wide a turn and one of the wheels caught in a ditch at the side of the road and broke off short. The car went head down and turned completely over. Renault was thrown head first against a tree and had his skull fractured. He remained unconscious for some time and his recovery was hoped for, but he did not survive. The death of Renault is the most regrettable accident of the race, and has been deeply felt by those who esteemed him for his skill as well as his personal qualities. His machinist was also severely wounded. Lorraine Barrow had a serious accident shortly after leaving Libourne. While going at full speed a dog ran under the wheels, causing the car to make a terrible swing to the right, running it into a tree while at a speed of 60 miles an hour. The machinist, Pierre Rodez, was thrown against the tree and instantly killed. Lorraine Barrow was found in an unconscious state and sustained various injuries, but at last reports it is thought he will recover. Near Montguyon, Mr. Stead, who piloted a De Dietrich car, tried to pass another racer in front of him and a collision took place. Stead was thrown out, and although injured, is expected to recover within a short time. Madame Du Gast, after having passed among the first, stopped for nearly two hours to look after Mr. Stead and was thus considerably behind in the race. The machinist was killed outright. A number of accidents are reported among the spectators. A soldier named Dupuy and several others were killed. M. Georges Richard, the well-known automobile constructor, while conducting a racing car, ran into a donkey-cart and was thrown from his machine, but is only slightly injured. The car piloted by Mr. Terry, the American chauffeur, had a collision with a competitor and was completely burned, as the gasoline reservoir took fire. Details of this disaster are given in the current issue of the SUPPLEMENT.

Owing to the numerous accidents, the authorities refused to allow the race to proceed further than Bordeaux.

SOME EXPERIMENTS WITH ACTINIC LIGHT.

BY J. W. KIME, M.D.

The light of the sun is composed of three distinct kinds of rays, luminous, heat, and chemical or actinic rays.

The visible solar spectrum extends from the red, having a wave length of about 0.76 micron, to the violet, having a wave length of about 0.40 micron. The ultra-red rays have a greater wave length, and the ultra-violet shorter wave length than those which lie within the visible bands of the spectrum. The chemical waves of light, with which we are chiefly concerned in therapy, lie principally in the blue bands of the spectrum, and have a wave length of about 0.49 micron to about 0.40 micron.

Since it is actinic light that produces the chemical changes in the silver salts in the sensitized plates and papers used in photography, we may thus readily ascertain those bands in the solar spectrum which are rich and those that are poor in the rays which we desire to isolate and utilize in the treatment of disease.

With this object in view, and with the able assistance of a photographer, Mr. G. L. Hostetler, the following experiments were made:

Experiment No. 1.—Strips of glass corresponding in color to the various colors of the solar spectrum were arranged as follows: Red, orange, yellow, green, blue, indigo, violet, open space, plain glass. These strips were fixed in a frame and were bound to a sensitized plate, after which they were exposed, almost instantaneously, to very weak, diffused daylight, which entered the dark-room without passing through glass. In this manner we obtained a true photograph of actinic light through open space, plain glass, and through glass of various colors.

Fig. 1 shows this result. We take the open space, in which no glass intervened between the light and the sensitized plate, as representing 100 per cent of the actinic light which reached the plate. Comparing this with that admitted through plain glass and through blue glass, we are unable to recognize any difference whatever between the open space and blue glass, while the plain glass is a shade darker, showing that less actinic light passed through it than through either of the other two.

From this photograph it will be seen that blue glass cuts off no chemical light, and consequently that the ultra-violet rays are either not markedly actinic or that the blue glass does not retard their passage. It is very evident that 100 per cent of actinic light has reached the plate through the blue glass. Why the plain glass, which was perfectly transparent and of the same character as the imported photographic plates should be less translucent to the chemical rays than the blue glass I am unable to say, and I present the photograph